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Qianying Xu
University of Iowa

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Qianying Xu

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Thesis Supervisor: Professor David Mauer

Graduate College
The University of Iowa
Iowa City, Iowa

CERTIFICATE OF APPROVAL

PH.D. THESIS

This is to certify that the Ph.D. thesis of

Qianying Xu

has been approved by the Examining Committee for
the thesis requirement for the Doctor of Philosophy degree
in Business Administration at the May 2015 graduation.

Thesis Committee:

David Mauer, Thesis Supervisor

Artem Durnev

Amrita Nain

Paul Hribar

Shagun Pant

To my parents

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ABSTRACT

This thesis consists of three chapters. The first chapter is sole-authored and is titled 'Cross-border merger waves.' The second chapter is coauthored work with Professor David Mauer and Kyeong Hun Lee and is titled 'Human capital relatedness and corporate mergers and acquisitions.' The third chapter is coauthored work with Professor Amrita Nain and Kyeong Hun Lee and is titled 'Repetitive cross-border mergers and acquisitions.'

First chapter examines the valuation effects of cross-border merger and acquisition (M&A) waves that occurred during 1990 and 2010. I document that, like domestic mergers, cross-border mergers cluster by industry and time. Cross-border M&A waves create value overall: acquirer announcement returns as well as combined acquirer and target announcement returns within waves are positive and significantly higher than those outside of waves. Post-merger operating performance is also better for within-wave cross-border deals. In stark contrast to domestic merger waves, deals undertaken later in cross-border merger waves tend to outperform those earlier in waves within a given industry. The late entrant's outperformance is stronger if the target country is different from the acquirer country in terms of culture, financial development, and legal system. Firms' acquisition decisions in cross-border merger waves depend on the stock market reaction to recent deals undertaken by industry peers in the same country. Overall, my results suggest that cross-border acquisitions promote efficient redeployment of corporate assets. Further, information asymmetry stemming from differences between acquirer and target countries plays an important role in the timing and performance of reallocation of corporate assets across national borders.

Second chapter constructs a measure of the pairwise relatedness of firms' human capital to examine whether mergers are motivated by a desire to harvest synergies through complementarities in human capital. Mergers are more likely between firms with more similar human capital. Consistent with synergy creation, we find that combined acquirer and target firm announcement returns and post-merger operating cash flows increase when firms have more closely related human capital. These effects are robust to controlling for product market synergies, deal characteristics, and merging firm characteristics. Evidence suggests, however, that human capital relatedness and product market relatedness are substitutes in that the likelihood of a merger and the associated announcement returns decrease when merging firms have closely related human capital and products. Our findings support the view that combining firms to capitalize on complementarities in human capital is a significant factor motivating mergers and acquisitions.

Third chapter examines repetitive deals in the same target country. We find that as acquirers repeat cross-border deals in the same country, (i) the time between successive deals declines, (ii) the percentage of ownership stake acquired increases, and (iii) the percentage of consideration paid in cash increases. To further distinguish whether such patterns are consistent with learning or hubris, we examine repetitive cross-border deals at two different stages of learning: experience-building versus memory-loss periods (as in Hayward (2002)). We find that as the acquirer makes more deals in the country, the time between deals decreases and the abnormal announcement return increases in experience-building periods, whereas such patterns do not exist or are reversed in memory-loss

periods. Our results suggest that firms gain by learning as they repeat acquisitions in the same country.

PUBLIC ABSTRACT

My dissertation examines the valuation effects of merger and acquisition activities. In the first chapter, I investigate the development, nature, and performance of cross-border merger waves and how firms time their cross-border merger decisions during a merger wave. In the second chapter, I examine the effects of important human capital on corporate diversification strategies and valuation consequences. In the third chapter, I look at how learning takes place in cross-border mergers and whether learning from firms' own past experience leads to better cross-border investment outcomes.

My dissertation suggests that cross-border mergers are a value-creating strategy. Firms overcome risks and difficulties surrounding cross-border mergers and acquisitions by learning from their own and their peers' deal experience. Human capital is an important consideration for corporate mergers and acquisitions. Mergers and acquisitions create more value when merging firms have related human capital.

Overall, my research advances our understanding of how firms make merger deals and their consequences, in both domestic and international markets.

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CHAPTER 1

CROSS-BORDER MERGER WAVES

1.1 Introduction

The volume of cross-border mergers and acquisitions (M&As) has dramatically increased since the mid-1990s. Across countries (both developed and developing) and industries, cross- border M&As have become more popular and are now a major component of foreign direct investment. Accordingly, recent studies in the M&A literature have examined the determinants of cross-border merger activity. Factors that are time-invariant or slowly varying, such as a country's culture, legal system, and accounting standards, as well as fluctuations in stock market valuations, foreign exchange rates, and political uncertainty are known to affect cross-border takeover activity between countries (see, e.g., Rossi and Volpin (2004), Erel, Liao, and Weisbach (2012), and Ahern, Daminelli, and Fracassi (2014)) . However, our understanding of cross- border M&As is still very limited compared to domestic mergers. In particular, we do not know much about (1) whether and why cross-border mergers occur in waves, (2) whether cross-border takeovers during waves are different from those outside waves in terms of value creation, and (3) how firms time their merger decisions during cross-border merger waves.

In this paper, I aim to enhance our understanding regarding the similarities and dissimilarities between cross-border and domestic merger waves. In particular, I examine cross- border merger waves at the industry level, whereas most evidence in the extant literature on cross-border M&As is limited to country-level analysis. Using cross-border mergers and acquisitions in which the acquirer firm is from the US and the target firm is

from one of 47 foreign countries during 1990 and 2010[1], I document that cross-border mergers tend to cluster by industry and time, similar to domestic merger waves (see, e.g., Mitchell and Mulherin (1996) and Andrade, Mitchell, and Stafford (2001)). Cross-border merger waves occur across various industries and target countries during my sample period. Many waves follow changes in the host government's policies, including deregulation and trade liberalization.

I further examine whether cross-border mergers within waves are different from those outside waves. In particular, I test whether value is created or destroyed during cross-border merger waves. This question is important in that it will shed light on the motivation for cross- border merger waves. In the literature, several explanations for domestic merger waves have been suggested. First, the neoclassical theory of mergers suggests that mergers occur to help redeploy corporate assets toward more efficient use (see, e.g., Gort (1969) and Mitchell and Mulherin (1996)). Mitchell and Mulherin (1996) and Harford (2005) argue that industry-specific shocks, which require efficient asset reallocation, drive domestic merger waves. Neoclassical theory predicts that mergers will enhance shareholders' wealth. On the other hand, agency theory suggests that merger waves are driven by the misalignment of interests between management and shareholders, and are therefore value-destroying. Jensen (1986), for instance, argues that managers can undertake value-destroying mergers for managerial entrenchment and empire building, and many empirical studies, including Jensen and Ruback (1983) and Duchin and Schmidt (2013), support this view.

[1] The cross-border mergers data from Thomson Securities Data Company are not comprehensive in the 1980s, and my analysis requires stock returns and accounting information data for non-US firms, which are more available from 1990. For such reasons, my sample starts from 1990.

To test whether cross-border mergers create wealth, I look at stock market reactions to cross-border deal announcements within and outside merger waves. I find that acquirer announcement returns and merger synergy (combined acquirer and target returns) during cross- border merger waves are positive and significantly greater than those outside waves. I also examine post-merger operating performance and find that cross-border deals in waves exhibit better operating performance than those outside waves. The evidence lends support to the neoclassical view that cross-border merger waves facilitate efficient reallocation of corporate assets.

I document that cross-border deals later in waves outperform those earlier in waves. This stands in sharp contrast to the evidence documented in studies of domestic merger waves. Studies examining the relation between the timing of mergers and the valuation consequences within waves find that mergers earlier in waves perform better than those later in waves (see, e.g., Carow, Heron, and Saxton (2004) and Goel and Thakor (2010)). Carow, Heron, and Saxton (2004) refer to the theory of first-mover advantage (see, e.g., Lieberman and Montgomery (1988)) and argue that late entrants in merger waves underperform because good takeover targets, which can enhance firm value, are scarce and are taken by early bidders. Goel and Thakor argue that late mergers within waves are motivated by managers' self-interest and are thereby value- destroying.

I explore potential explanations for late entrants' outperformance in cross-border merger waves. Compared to domestic investments, cross-border investments involve additional layers of uncertainty regarding the host country's cultural, legal and business environment. For example, differences in legal systems and accounting standards between acquirer and target countries can make it more difficult to identify value-

enhancing takeover targets. Also, cultural dissimilarity and potential nationalism can be another source of uncertainty for the success of foreign investment (see, e.g., Ahern, Daminelli, and Fracassi (2014) and Fisman, Hamao, and Wang (2014)). In the presence of such uncertainty, real options theory suggests that firms should wait to invest until the uncertainty is resolved if their investment is difficult to reverse (see, e.g., McDonald and Siegel (1986), Dixit and Pindyck (1994), and Rivoli and Salorio (1996)). When new investment opportunities arise in a foreign market (e.g., industry deregulation), late entrants can learn from early entrants' experience (i.e., they can learn from others' successes and/or failures), thereby making better investment decisions (see, e.g., Bikhchandani, Hirshleifer, and Welch (1992, 1998) and Luo (1998)). If my results are driven by learning, late entrants' outperformance in cross-border merger waves should be more pronounced in target countries where learning is more important. Such countries should be the ones that are very dissimilar from the acquirer country in terms of culture, geographic distance, and legal systems, among others. I find that this is the case; indeed, late entrants in cross-border M&A waves exhibit even higher performance in such target countries.

I further investigate how bidders time their cross-border merger decisions within waves. During merger wave periods, I find that firms' cross-border merger decisions depend on how stock markets have responded to recent cross-border deals undertaken by their industry peers. Firms are more (less) likely to undertake cross-border mergers in the same country if they observe positive (negative) stock price reactions to deals made by their industry peers in previous quarters. I do not find such a relation for deals undertaken outside merger waves. Moreover, my results show that the market response to non-peers'

prior acquisitions does not significantly affect firms' merger decisions. The evidence here suggests that late entrants' merger decisions depend on how (either well or badly) early entrants have done, which lends further support to the learning hypothesis.

Lastly, I ask why firms want to be early movers, despite the risk of inferior performance. I identify salient firm-level factors that explain the timing of a firm's participation in waves. I find that smaller and younger firms, which are less financially constrained, are more likely to be early movers. I also find that more innovative firms, which take more risk to differentiate themselves from their rivals, are more likely to enter the market earlier. Further, firms with diminished growth opportunities in their domestic markets are more likely to take advantage of gains arising from market inefficiencies across national borders, and thus enter foreign markets earlier. My results are consistent with prior studies in the strategic management and FDI literature regarding which firms are early versus late movers in response to new investment opportunities (see, e.g., Lieberman and Montgomery (1988, 1998)).

My findings relate to several strands of literature. First, my paper contributes to the literature on cross-border mergers and acquisitions. I document that cross-border M&A activity comes in waves within industries.[2] More importantly, for the first time in the literature, I examine the performance of cross-border mergers within and outside of waves. My findings show that cross-border merger waves create value overall, which

[2] A recent study by Makaew (2012) defines cross-border merger waves at the country level and finds that those waves are strongly associated with economic conditions. My work, however, defines cross-border merger waves at the acquirer industry level and focuses on the dynamics of cross-border takeover activities across industries and time periods. More notably, my study's focus is on the similarities and differences between within-and outside-wave deals in terms of valuation effects.

stands in contrast to the evidence on domestic merger waves (see, e.g., Duchin and Schmidt (2013))[3]. Specifically, cross- border M&As undertaken within waves have greater bidder announcement returns, combined returns of bidders and targets (i.e., synergy), and post-merger operating performance, which in turn supports the neoclassical theory of mergers.

Second, my study sheds light on the effects of learning from peers on cross-border investment decisions. Prior work in the literature, for example McDonald and Siegel (1986) and Dixit and Pindyek (1994), shows that uncertainty discourages investment; the option value of waiting increases with uncertainty, therefore investors delay investment until the uncertainty is resolved. A recent study by Aktas, Bodt, and Roll (2013) examines how learning-by-doing affects firms' cross-border acquisitions. My paper highlights the role of learning from industry peers as a mechanism through which uncertainty is (at least partially) resolved. I document that the timing of cross-border merger decisions depends on how well their industry peers have done recently, and that late entrants on average receive higher abnormal returns in cross-border merger waves. All of these results are stronger when target countries are more fundamentally different from acquirer countries, which further supports the hypothesis that late entrants gain benefits by learning from peers' experience.

Lastly, my results have important policy implications. Policymakers should endeavor to make their economic environment more attractive to foreign investors. Cross-

[3] Early evidence shows that acquirer abnormal returns during domestic waves are insignificantly different from zero (e.g., Andrade, Mitchell, and Stafford (2001)).

border merger waves create value for both acquirers and targets. My results suggest that policies, such as deregulation or trade liberalization, are desirable.

1.2 Hypotheses development

This section draws on the literature in finance and economics to develop testable hypotheses about the valuation implications of in-wave and out-of-wave mergers. Depending on the motives of merger waves, predictions regarding merger announcements and performance consequences can vary.

1.2.1 Neoclassical theory

Centering on economic fundamentals, neoclassical theory suggests that merger waves occur in response to industry-level structural change caused by economic shocks, such as deregulation, government policy, and technological innovations. Under this view, corporate mergers and acquisitions serve as a means of creating value by reallocating resources to where they are best used. Once a shock arrives, merger activity clusters as a result of firms' simultaneous reaction to combine with the best assets, which improves efficiency. This line of research dates back to an early study by Gort (1969), who uses an economic disturbance model to link the frequencies of takeover activities to changes in technology. Jovanovic and Rousseau (2002) extend Gort's work and show that firms with a high Q (ratio of the market value to the replacement cost of capital) acquire those with a low Q in a merger wave following technological changes. Mitchell and Mulherin (1996) and Andrade, Mitchell, and Stafford (2001) document the clustering of US domestic merger activities across industries following economic- related shocks, such as industry regulation or abrupt changes in energy prices. Harford (2005) also finds that industry-

specific shocks induce merger waves. However, his result suggests that economic shocks alone are not enough to create merger waves unless accompanied by capital liquidity.

The neoclassical hypothesis rests on the prediction that merger waves prompt capital reallocation from less to more productive firms, and therefore, that mergers are beneficial for both acquirers and targets. In line with this theory, mergers within waves are expected to outperform those outside waves.

1.2.2 Agency theory

In contrast to neoclassical theory, the agency view of mergers highlights the misalignment of interests between managers and shareholders. Mergers are induced by managers' tendency to expand firms beyond their optimal sizes, which increases the managers' power, but hurts shareholders' value. Jensen (1986) lays the groundwork of the agency view. He suggests that firms' substantial free cash flows may provide managers with incentives to pursue unprofitable acquisitions for the sake of strengthening ownership.

In a similar vein, Gorton, Kahl, and Rosen (2009) propose a theoretical model in which managers increase firm size through takeovers in order to maintain control rights. They suggest that as larger firms are less likely to be acquired, self-interested managers undertake defensive acquisitions with a preemptive motive to avoid being taken over, which eventually triggers merger waves. Goel and Thakor (2010) apply the agency hypothesis to their envy-based model where managers desire larger firms in order to receive higher pay. In this sense, managers envy their peers who have received higher compensation after undertaking mergers for expansion; thus, they are more likely to make acquisitions themselves, even if such deals are value- decreasing.

Overall, the agency theory emphasizes the notion that managers pursuing private benefits are likely to engage in less profitable or even value-destroying acquisitions. Accordingly, this hypothesis predicts that mergers within waves are inefficient and therefore underperform.

1.2.3 Valuation theory

This hypothesis is motivated by the positive association between merger activity and stock market valuation documented by Nelson (1959) and Maksimovic and Phillips (2001). It has been shown that acquisition activities cluster in the periods of high market valuation. Unlike neoclassical and agency theories, the valuation hypothesis does not yield direct, unequivocal predictions on merger outcomes.

If the increased stock price represents either a more favorable business environment with better investment opportunities or cheaper financial capital to carry out positive net present value projects, this theory should generate the same prediction as the neoclassical hypothesis. Mergers during waves should perform better than mergers occurring at other times.

Shleifer and Vishny (2003) and Rhodes-Kropf and Viswannathan (2004) propose a misvaluation model and show that merger waves can be caused by the use of overvalued equity to purchase relatively undervalued target firms during bull markets. They both argue that these valuation-driven acquisitions are advantageous and create shareholders' value. Savor and Lu (2009) find empirical support for their prediction.

However, Jensen (2005) suggests that overvalued equity may aggravate agency conflicts between managers and shareholders. Acquisitions occur as a result of managers' pursuing self- benefit, and are therefore value-decreasing.

1.3 Data

1.3.1 Merger data

I begin with mergers and acquisitions from Thompson's Securities Data Corporation (SDC) over the period from 1990 to 2010. The initial sample covers all announced and completed cross-border deals in which a US firm acquires a foreign target firm domiciled in one of 47 foreign countries. A cross-border merger is defined as a deal in which neither the acquirer firm nor its ultimate parent is domiciled in the same country as the target firm. I exclude leverage buyouts, spin-offs, recapitalizations, self-tender offers, exchange offers, repurchases, minority stake purchases, acquisitions of minority interest, and privatizations. I also exclude firms in the financial services (SIC codes 6000-6999) and utility (SIC codes 4990-4999) industries. As Netter, Stegemoller, and Wintoki (2011) suggest, a large majority of M&A activities involve private or subsidiary targets. To present a more representative cross-border M&A sample, I include all public, private, and subsidiary acquirers and targets except for government agencies.

To construct the sample, I first sort cross-border M&A deals by the acquirer's industry and the target's nation. I classify the acquirer's industry based on the Fama-French 12 industry definition. I next create industry-country pairs in each year. This procedure generates a cross- border merger sample of 14,584 industry-country-year triplets across 12 industries, 47 countries, and over the time period from 1990-2010.

Table 1 presents an industry-country matrix, illustrating the number of cross-border M&As initiated by firms in a US industry to a target country. The cross-border M&As included in my study are fairly distributed geographically. My sample covers target firms from Asia, Europe, North America, South America, Africa, and Australia.

The top-five target nations that have the largest volume of M&A activity with the US are the United Kingdom (3,019 targets), Canada (2,715), Germany (1,323), France (932), and Australia (606). The two US industries that have the largest number of cross-border merger deals are business equipment (4,325 deals) and manufacturing (2,349).

I gather deal-specific variables from SDC, including announcement and completion dates, transaction value in US dollars, bid premium, the percentage purchased by the acquirer, payment method, and termination fees. In addition, I collect information on the acquirer and target companies, such as the name, ultimate parent, public status, country of domicile, and primary industry defined by the four-digit SIC code.

To examine the cross-border merger returns and performance consequences of merger waves, I gather daily stock price data from the Center for Research in Security Prices (CRSP) for US firms and gather $US-denominated daily stock prices from Datastream for non-US firms. Following Masulis, Wang, and Xie (2007), abnormal returns are estimated by market model adjusted stock returns around the acquisition announcement date. The cumulative abnormal returns (CARs) in my analysis are calculated by summing up the abnormal return for each day over a seven-day event window (-3, +3)[4]. I chose a seven-day window to fully capture the market reaction to a cross-border acquisition announcement. Target countries in my sample are spread out all over the world, so an acquisition may first be announced in a target country when the US market is closed, or it may first be announced in the US while the target country is on holiday. Furthermore, different disclosure and stock trading regulations may also result in

[4] Results are qualitatively similar if I use announcement returns over different event windows (e.g., CAR (-2, +2)).

a delay in stock market reactions (see, e.g., Ellis et al. (2011)). The CRSP value-weighted return is employed as the market return and the market model parameters are calculated from 280 to 30 days before the acquisition event. Using these CARs, I create two key performance measures: the acquirer's abnormal announcement return (acquirer CAR) and the combined acquirer and target announcement return (combined CAR).

Annual accounting information is obtained from Compustat for US firms and from Datastream for non-US firms. These firm-specific variables include the book value of equity, total assets, cash holdings, market capitalization, long-term debt, short-term debt, return on assets, total sales, free cash flow, and R&D expenses.

For the analysis, I also gather country-level variables to control for macroeconomic conditions. I gather annual GDP (in US dollars) and annual GDP per capita (in US dollars) from the World Bank to account for the size and personal wealth of target countries. Froot and Stein (1991) and Erel, Liao, and Weisbach (2012) demonstrate that stock market returns and exchange rates can influence cross-border investment. For this reason, I control for differences in stock market return and currency valuation between the US and target countries. Country-level stock market return data are obtained in US dollars from Datastream, and real exchange rate data in US dollars are from the Penn World Table.

Prior literature has documented the important roles of culture and institutional environment in explaining cross-border investment activities (see, e.g., Ahern, Daminelli, and Fracassi (2012), Morosini, Shane, and Singh (1998), and Ross and Volpin (2004)). Following Stulz and Williamson (2003), I use religion and language as proxies for national culture. The information on these cultural variables is acquired from the Central

Intelligence Agency (CIA) World Factbook, which provides the languages (religions) spoken (followed) by the populations of various countries. To capture country-level cultural differences, I create two dummy variables, same language and same religion, and set them equal to one if a target country shares the same language and religion with the US. Proxies for a country's institutional and regulational characteristics are obtained from La Porta et al. (1998). Based on their definition of national legal origins, I classify target countries in my sample into common law and non-common law groups. I construct a dummy, common law, to characterize the similarity of legal systems between the US and target countries. Rule of law is another measure taken from La Porta et al. (1998), which ranges from 0 to 10 and represents the quality of a country's law enforcement. These two variables are also indicative of the degree of a country's investor protection and corporate governance system (La Porta et al. (2006) and Rossi and Volpin (2004)). In addition, early work has indicated that geographic distance can be a factor in relation to cross-border investment; therefore, I control for the geographic distance between the US and target countries. Using the geographic location data of capital cities from mapsofworld.com and applying Erel, Liao, and Weisbach (2012)'s great circle formula[5], I calculate the shortest distance between the capital of the US and the capital of a target country.

1.3.2 Merger waves

The primary research objectives in this paper include comparing/contrasting (1) cross- border mergers occurring within versus outside waves; and (2) mergers undertaken by early versus late entrants in a wave. I follow Carow, Heron, and Saxton (2004) and

[5] For a more detailed description of the great circle formula, see Erel, Liao, and Weisbach (2012).

manually define a merger wave occurring in a given industry. First, for each acquirer-industry/target-country pair, I identify a peak year, where the number of cross-border acquisitions is the largest over the sample period, 1990-2010. I require that there be at least 10 cross-border deals in the peak year. I also require that the total number of cross-border deals for a given pair during the entire sample period be no less than 30. Second, I define the start-/end-year of a merger wave as follows: the start-year of a merger wave is defined by moving backward from the peak year until I identify the first year (t1), where the number of deals falls below one-third of the peak-year deals. The following year (t1+1) is defined as the start-year of a merger wave. The end year of a merger wave is defined in a similar way, but by moving forward from the peak year until I find the year (t2) where the number of cross-border acquisitions falls below one-third of the number of peak- year deals. The preceding year (t2-1) is classified as the end-year of the merger wave. Lastly, but more importantly, I manually check each wave to ensure that the volume of merger activity during a wave follows a bell-shaped curve. In order to conduct an analysis contrasting early movers with later-stage deals, I define early entrants (first movers) as acquirers who make deals in the first 20% of cross-border acquisitions in a wave.

In my analysis, I identify 46 cross-border merger waves across 10 industries and 16 countries. Nine out of ten industries have more than one cross-border wave during the sample period. Among them, I observe two waves from the consumer non-durable industry (FF1), two waves from consumer durables (FF2), nine waves from manufacturing (FF3), one wave from energy (FF4), two waves from chemicals and allied products (FF5), fifteen waves from business equipment (FF6), two waves from telephone

and television transmission (FF7), three waves from wholesale, retail and some services (FF9), three waves from healthcare, medical equipment and drugs (FF10), and seven waves from others (FF12). Almost half of the waves take place in the 1990s, while the other half occurs in the 2000s. These within-wave deals account for almost 42% of my sample, while the other 58% of the mergers take place outside of waves.

A description of industry-clustered cross-border merger waves and more information on acquirer industries and target countries are shown in Table 2. For example, let us take a look at the merger wave from the US telephone and television transmission industry (Fama-French 7) to the United Kingdom (UK), one of US acquirers' favorite countries. Most targets in this wave belong to the telecommunications sector, such as telephone, television, computer networks, and Internet companies. The wave followed the deregulation and liberalization that took place in the UK telecommunications sector in the 1990s. In March 1991, the White Paper, "Competition and Choice: Telecommunications Policy for the 1990s" (see, OECD (2002)), was published by the British government to terminate their duopoly policy and to promote more competition and growth of the telecommunications sector. Meanwhile, US telecommunication sectors were deregulated in 1996, which may have catalyzed cross-border mergers for firms seeking competitive growth. Overall, all of these regulatory changes led to an increased volume of cross- border mergers between the US and the UK in the telecommunications and associated information technology sectors. Indeed, most cross-border merger waves documented in my study were prompted by government policies, such as financial liberalization, privatization, and regulatory reforms.

Table 3 reports the descriptive statistics for my overall sample and compares the deal and firm characteristics of the inside versus outside-wave mergers. All variables are defined in the appendix A. The significance of the difference in the means and medians is tested by t-tests and Wilcoxon rank-sum tests, respectively. As seen in the table, the mean of the transaction value for in-wave deals is $ 157.31 million, compared to $ 182.37 million for out-of-wave deals. The relative size, calculated as the ratio of the transaction value to the acquirer's total assets, is significantly larger for deals within waves. A notable finding is that acquirers are more likely to finance deals in cash than in stock. On average, 68.74 % of the cross-border deals are paid in cash, while only 24% are paid with stock. This prevalence of cash payment in cross-border transactions has been documented by Moeller and Schlingemann (2005) and Starks and Wei (2013)[6], and is possibly explained by targets' reluctance to accept foreign equity (see, Gaughan (2002)). Similarly, the percentage of all cash deals is significantly greater than that of all stock deals. However, I find that deals made during waves tend to be financed using stocks, while cash payment is the favored method used in outside-wave deals. The percentage of deals using a mixture of stocks and cash as a payment method is 15% in my sample. In addition, my sample reveals that 67% of deals involve firms in related Fama-French 12 industries. In particular, within-wave acquirers tend to select inter-industry targets more than their outside-wave counterparts (71% versus 64%). Similar to the high proportion of private targets documented by Netter et al. (2011), public targets only account for 6% of my overall sample.

[6] Moeller and Schlingemann (2005) find that the average percentage of consideration paid in cash is 78% of their cross-border sample. Starks and Wei (2013) document that 72% of their 371 cross-border deals were solely paid in cash.

Focusing on acquirers, outside-wave acquirers are significantly larger. The mean (median) of the logarithm of total assets is $6.58 ($6.55) million for inside-wave mergers, and $7.01 ($7.00) million for outside-wave mergers. Acquirers outside merger waves also have higher leverage and higher ROA. The market-to-book ratio is significantly larger for bidders during waves than for bidders outside waves. The average of stock price runup for in-wave acquirers is not statistically indistinguishable from that for outside-wave acquirers.

1.4 Results

1.4.1 Inside versus outside cross-border merger waves

1.4.1.1 Announcement returns analysis

I start my analysis by comparing stock market reactions to cross-border deal announcements inside waves to those outside waves. Panel A of Table 4 reports the mean and median comparisons for the overall sample, inside and outside merger wave deals. For all cross- border transactions, the average and median acquirer returns are 0.77% and 0.28%, and both are significant at the one percent level. This result is comparable to the acquirer returns of cross- border M&As reported in prior studies.[7] The mean and median return for target firms are 24.35% and 18.43%, respectively, and both are significantly different from zero at the one percent level. The combined returns are also positive and statistically significant. These findings are consistent with prior evidence that cross-border M&As are wealth-creating and benefit both acquirers and targets (see, e.g., Kang

[7] Moeller et al. (2010) find an average acquirer abnormal return of 1.5% for their cross-border control acquisition sample in 61 countries undertaken between 1990 and 2007. Chari, Ouimet, and Tesar (2010) examine the cross- border acquisitions from developed markets to emerging markets and document the average acquirer return of 1.16%.

(1993) and Markides and Ittner (1994)). Moreover, similar to domestic M&As, larger gains accrue to target firms. I further find that deals occurring in a wave have greater abnormal CARs for acquiring firms and target firms. The average acquirer and target abnormal returns are 0.567 and 5.519 percentage points larger during merger waves, respectively. The difference in synergistic values between inside and outside-wave deals is insignificant.

Panel B of Table 4 reports regression results. Using all cross-border deals by US firms announced between 1990 and 2010, I estimate the following model:

$$CAR_n = \alpha + \beta * within\ wave + \mu_n + \varepsilon_n \quad (1.1)$$

The dependent variable is the acquirer's abnormal announcement return (-3, +3) in Models (1) and (3) and the combined acquirer and target abnormal announcement return (-3, +3) in Models (2) and (4). The key variable of interest, *within wave*, is a dummy equal to one if the cross-border merger occurs inside a merger wave. The model specifications include firm- and deal-level control variables that may influence the market reaction. All control variables are specified in the legend of Table 4 and are defined in the appendix A. Importantly, I take into account target country-level factors, such as general macroeconomic conditions and time-invariant (or slow- moving) variables. Models (1) and (2) control for the target country religion, language, geographic distance, and legal systems, which can affect announcement returns (see, e.g., Ellis et al. (2011) and Ahern, Daminelli, and Fracassi (2014)). In Models (3) and (4), I use target country fixed effects to account for all potentially unobservable time-invariant country characteristics. I also include the acquirer industry fixed effects to control for unobservable, non-time varying

heterogeneity across industries. Year fixed effects allow me to account for (unobservable) common and year-specific shocks. Reported in parentheses below the coefficient estimates are t- statistics computed using robust standard errors (see, Petersen (2009)).

As observed in Panel B, the *within wave* dummy is positively and significantly associated with shareholder wealth. For example, Model (1) finds that acquirer announcement returns during cross-border merger waves are 0.76% higher than those outside waves. Thus, holding other factors constant, my evidence shows that within-wave deals outperform out-of-wave ones.

In Model (2), I examine merger synergy within and outside waves by re-estimating the model with the combined acquirer and target returns as a dependent variable. The combined returns are the weighted average of the acquirer and the target's abnormal announcement returns, where the weights are based on the firms' market values of equity five days prior to the announcement date. For this analysis, I must require that the target firm be public and that its stock returns be available from Datastream. Note that this requirement significantly reduces the sample size down to 250 observations. The small sample results may or may not be representative of the entire cross-border mergers and acquisitions sample. However, for the sake of completeness, I present the estimation results. The coefficient of the *within wave* dummy is positive and significant. As seen in the regressions, the combined returns are roughly 3% higher within waves as compared to outside waves. This result suggests that cross-border transactions within waves have larger synergistic value than transactions outside waves.

Turning to the control variables, acquiring firm size is negatively associated with announcement returns, which is consistent with prior literature. Not surprisingly, the

combined acquirer and target returns are positively associated with acquirers' ROA and all cash-financed bids. The negative coefficients on GDP growth seem to suggest that acquirers realize more gains in target countries that have low GDP growth rates.

Overall, the results shown in the table suggest that cross-border mergers during waves create greater value than out-of-wave mergers.

1.4.1.2 Real performance analysis

I have provided evidence of value-creating cross-border merger waves based on announcement period stock returns. Considering the skepticism regarding whether the stock market response to the merger announcement reflects solely the merger value (see, e.g., Kaplan (2006)), I also examine real post-merger performance. In particular, I look at whether the value creation upon the merger announcement is followed by improvement in operating performance.

Typically, studies in the literature calculate pre-merger operating performance using the acquirer and the target's accounting information and compare this number to the acquirer's post- merger operating performance. The use of this methodology poses two challenges for my study. First, it requires the target firm's accounting information, which can dramatically shrink the sample size, as seen in the combined announcement returns analysis (Table 4). Second, Hoberg and Phillips (2010) argue that the traditional way to measure pre-merger operating performance can be problematic if the acquisition is a partial asset purchase or involves sales of divisions. Considering the limited availability of target firms' financial statements and the complexity of measuring pre-merger operating margins, I, therefore, focus on changes in acquiring firms' operating performance during post-merger periods.

To compare the post-merger operating performance of cross-border deals within versus outside waves, I estimate the following regression model:

$$\Delta Operating\ performance_{n,(t+1,t+3)} = \alpha + \beta * within\ wave + \mu_n + \varepsilon_n \quad (1.2)$$

The dependent variable, *ΔOperating performance*, is the acquirer's operating performance in year t+3 (or year t+4) minus the operating performance in year t+1, in which year t is the deal announcement year. Operating performance in year t is defined as net income before extraordinary items in year t scaled by net sales in year t (i.e., return on sales) minus the median of this ratio for firms in the same Fama-French 12 industry.

Table 5 reports the estimation results. Similar to announcement period returns, I find that within-wave deals deliver better post-merger operating performance than outside-wave deals. Return on sales is approximately 1% higher for cross-border deals announced during merger waves. The coefficient on *within wave* ranges from 0.7% to 1.1% and is significant at 5% in all models except Model (1), where it is marginally significant.

The results of announcement returns, as well as post-merger operating performance, lend support to the argument that cross-border M&As promote efficient asset reallocation and thereby enhance shareholder value. As such, the results are inconsistent with the agency view of mergers, in which managerial self-interest drives mergers. In the next section, I demonstrate differences in cross-border deals occurring in the early versus late stages of cross-border merger waves. Such an analysis will advance our understanding of potential sources of merger gains.

1.4.2 Early versus late mergers within cross-border waves

A stylized fact of domestic merger waves in the US market is that the timing within a wave matters, and mergers occurring during the early phase of a wave create more value than those occurring later in a wave. Carow, Heron, and Saxton (2004), for instance, find that early deals outperform late deals during merger waves in the US market. They posit that early bidders use their superior information to identify better acquisition targets, thereby gaining a competitive edge over their rivals. Goel and Thakor (2010) also document that early deals in waves create more shareholder value than late deals. They argue that mergers at the later stage of a wave are a result of CEOs' preference for larger firms, which can provide higher compensation rather than create shareholder value. Although the two studies differ in terms of why firms participate in merger waves early (or later), both agree that early bidders acquire targets with greater value than do late bidders.

In Table 6, I examine whether and how the timing of entry within a cross-border merger wave matters for shareholder wealth. I restrict the sample to cross-border deals within waves, which results in 2,413 transactions. For each wave, I classify the first 20% of deals as first movers.

Panel A presents the average and median cumulative acquirer, target, and combined returns for early and late deals during a merger wave. I find that early acquirers earn significantly less than deals at later stages. The average and median abnormal returns for early entrants are 0.08% and -0.22%, but are not statistically distinguishable from zero. By contrast, the mean and median returns for later acquirers are 1.34% and 0.61%, and are both significant at the one percent level. The results for targets exhibit a similar

pattern. The mean return received by early target firms is 17.67% and is significantly lower than the 28.71% return gained by late targets. Although the mean and median combined wealth gains for late movers are positive and significant, the difference between early movers and late movers is insignificant. The results presented in Panel A appear to suggest that the significantly positive returns for the in-wave sample are attributable to late movers' outperformance.

Panel B reports regressions that estimate the following equation:

$$CAR_n = \alpha + \beta * first\ mover + \mu_n + \varepsilon_n \quad (1.3)$$

Again, Models (1) and (3) find that, on average, acquirer gains are approximately 1.9% lower for deals undertaken early in a wave, as compared to later acquisitions. This result is in sharp contrast to the findings in Goel and Thakor (2010) for US domestic merger waves.

Models (2) and (4) use the combined abnormal returns of the acquirer and the target. I continue to find a significant negative coefficient on the *first mover* dummy, regardless of whether or not I include specific country characteristics or use country fixed effects. Early deals not only have lower bidder returns, but also lower merger synergies.

In Table 7, I instead use post-merger operating performance to test late-mover outperformance. The pattern in Models (1) through (4) are similar to the results using announcement returns in Table 6. In Models (1) and (2), I find that first entrants are outperformed by their later counterparts. Late movers outperform first movers by 3.6% from year t+1 to year t+3 and by 1.5% from year t+1 to year t+4.

This finding is inconsistent with Carow, Heron, and Saxton (2004), who document higher synergies for early deals (i.e., early-mover advantage). In the next section, I explore potential explanations for the results documented here.

1.4.3 Why do late deals create more value?

To understand why late deals create more value than early deals, I draw upon the real options literature. Cross-border mergers resemble domestic mergers in that two firms combine and come under single management. However, they significantly differ insofar as cross-border transactions involve additional risks and frictions, such as foreign exchange risk, cultural differences, and political risk. The literature is replete with empirical evidence regarding such risks and frictions in cross-border mergers. For example, Ahern, Daminelli, and Fracassi (2014) document that cultural difference between countries discourages cross-border M&A activity, and merger synergies tend to be lower between firms from culturally distant countries. Rossi and Volpin (2004) and Lee (2013) find that firms are reluctant to acquire targets from countries where investor protection is weak or where political risk is high, and firms tend to offer lower premiums if they decide to acquire such targets. In addition, firms incur an informational disadvantage relative to their local competitors in the target country. Lack of knowledge about the local industry and market structures makes the profitability of international investment more uncertain.

In light of the tradeoff between potential opportunities and tremendous uncertainties and difficulties, the decision on when to initiate a cross-border acquisition is critical. On the one hand, valuable potential targets are scarce; therefore, firms may embark on cross-border mergers earlier than their industry peers and may grab a head

start in foreign markets, i.e., a first-mover advantage (see, e.g., Lieberman and Montgomery (1988) and Tufano (1989)). On the other hand, firms may wait until peer firms enter the foreign market, and then utilize the hard-won information gained by their peers to better assess and execute deals. In other words, followers may avoid risks and eventually capture considerable advantages through observing prior successful and/or failed deals. Faced with uncertain environments and given the irreversible nature of cross-border M&As, it may be more important for firms to first learn from their peers' behavior and thereby develop the knowledge and capabilities required for successful transactions.

The real options literature provides theoretical support for this latter view. Dixit and Pindyck (1994) show that in the face of uncertainty, firms should postpone irreversible investment until such uncertainty is resolved. Grenadier and Malenko's (2010) model suggests that firms postpone investment under uncertainty; however, the timing of investment depends on the extent to which these firms learn. Their results suggest that learning can reduce uncertainty and encourage investment. My results on lower early bidder returns are consistent with the learning hypothesis.

1.4.4 Where is learning more valuable?

I perform several analyses to examine whether late bidders learn from early bidders and make better deals. If late bidders truly take advantage of learning, I would expect to observe greater benefits of learning in deals involving greater information asymmetry. When target countries differ substantially from the acquirer country (US) in terms of legal system, political environment, and culture, a cross-border acquisition would pose a greater challenge to bidders. In such countries, learning is likely to be more

valuable because it can help mitigate information risk during deal making. In this regard, I predict that late-bidder advantages are more pronounced in deals involving target countries that are more fundamentally different from the US.

To quantify the differences between the US and target countries, I construct an index based on target countries' GDP per capita, geographic distance, religion, law system, and regulations. I rank all target countries based on the index and create a dummy, *different*, which equals one if the target country belongs to the top quartile of countries that are most culturally/economically different from the US. I find that countries in Africa, Southern Asia, Southeast Asia, and Western Asia are most distant from the US in terms of the index.

As we can see, Models (5) - (8) in Table 6 find that late bidders outperform early bidders to a greater extent in countries that are in the top quartile of the index (i.e., *different*), which is consistent with my prediction. For example, in Model (5), late movers earn a 1.8% greater abnormal return in countries more fundamentally different from the US than in countries similar to the US. Model (6) shows that late deals undertaken in countries that are more different than the US earn 19.8% higher merger synergy.

With respect to acquirer and deal characteristics, I find that the market responds more favorably to acquirers with high market-to-book ratios and to deals fully financed with cash, but less favorably to transactions involving public targets. Similar to Panel B of Table (4), I find that the combined CARs are increasing in the acquirer's ROA. In addition, target country characteristics are significantly related to the gains shareholders make from acquisitions. For example, GDP per capita has a positive impact on merger synergy. Moreover, I find that acquirers experience greater returns in target countries

with high GDP growth rates, low stock market returns, and low currency valuations. Erel, Liao, and Weisbach (2012) find that mergers are more likely to take place between countries with greater valuation differences, and my results further suggest that greater acquisition gains tend to be realized in such transactions. I also show that mergers in common-law based countries generate lower returns. As common-law countries usually offer better shareholder protection and corporate governance mechanisms (see, e.g., La Porta et al., (1999)), my finding is consistent with Ellis et al. (2010) and Chari, Ouimet, and Tesar (2009), who report better acquiring-firm returns for acquisitions involving target firms from weak governance countries. One potential explanation for the considerable gains brought by cross-country difference is that environments with high information asymmetry make targets more likely to be undervalued, which hence generates superior benefits for acquirers.

I further examine post-merger operating performance for late movers into different countries. In Models (3) and (4) in Table 7, similar to announcement returns, I document that late movers have higher operating performance than first movers, and this pattern is more pronounced in the aforementioned different countries. The coefficient on *first mover* interacted with *different* is negative and significant. Late movers in those different countries outperform first movers by 15% from year t+1 to year t+3 and by 20% from year t+1 to year t+4.

Overall, the results are consistent with the learning hypothesis. Bidders participating in merger waves at a later point take advantage of information spillovers from prior deals by their industry peers.

1.4.5 Does peer success matter for the timing of cross-border mergers?

In order to provide further support for learning, I examine how firms time cross-border takeovers based on the success of peer merger decisions. I look at whether firms are more or less likely to undertake cross-border mergers after observing successful or unsuccessful peer firm deals in the target country.

Prior work has shown that firms tend to make corporate decisions based on the actions of other firms operating in a similar environment. A possible economic rationale to explain this behavior is referred to as "observational learning" or "information cascades" (see, e.g., Bikhchandani, Hirshleifer, and Welch (1992, 1998)). Corporate activity by similar firms provides relevant and timely information and accordingly affects a firm's investment and financing decisions. In this regard, industry peers' previous cross-border M&A activity should influence a firm's acquisition decision. More importantly, the perceived outcomes of other cross-border deals are likely to play a critical role in a firm's decision about whether or not to undertake acquisitions (see, e.g., Haunschild and Miner (1997)). Successful deals deliver positive information about investment opportunities in the target country's M&A market and thereby encourage follow-on deals by other firms. In contrast, unsuccessful preceding deals discourage a firm's acquisition activity in the same target country. Therefore, I predict that peer firms' previous merger performance positively affects the likelihood that a firm makes a cross-border deal in the same country.

To test my hypotheses, I create a quarterly time-series of cross-border merger activity for each acquirer industry and target country pair. The following equation is estimated:

$$Cross\text{-}border\ M\&A\ activity_{i,j,q,y} = \alpha + \beta * Peer\ CAR_{i,j,q-n,y} + \delta * Non\text{-}peer\ CAR_{i,j,q-n,y} + \mu_{i,j,y} + \varepsilon_{i,j,q,y} \quad (1.4)$$

where n = 1, 2 is the number of lags. The dependent variable, *cross-border M&A activity*, is defined as the number of cross-border mergers between acquirer Fama-French 12 industry *i* and target country *j* in quarter *q* in year *y*. The main variable of interest, *peer CAR*, equals the average cumulative abnormal announcement return of cross-border mergers undertaken by other firms from the same Fama-French 12 industry in the target country in the previous quarters. Another key explanatory variable, *non-peer CAR*, represents the average cumulative abnormal announcement return of cross-border mergers undertaken by firms from all other Fama-French 12 industries in the target country in the previous quarters. These two primary independent variables allow us to distinguish two types of potential learning: general learning associated with information transmitted from non-peers and learning more specific to the industry (i.e., learning from peers). If firms gain from both general and industry-specific learning, I expect both *peer CAR* and *non-peer CAR* to be positively associated with *cross-border M&A activity*. If firms benefit only from peer-specific learning, I predict a positive relation only between *peer CAR* and *cross-border M&A activity*.

One potential problem with the regression is that the dependent variable is a non-negative count variable, which would result in biased and misleading OLS regression coefficients. For this reason, I employ a Poisson regression model (see, e.g., Greene (2011)) to analyze the effect of peers' prior experience on a firm's acquisition decision. Table 8 reports the estimation results.

Model (1) shows that both peer firms' and non-peer firms' prior acquisition experience have a positive effect on a firm's cross-border acquisition decision, which suggests that both general learning and industry-specific learning take place. As learning effects may persist for more than one quarter, I replace the peers' average merger performance in the previous quarter with their performance over the prior two quarters (from t-2 to t-1) and re-estimate the equation in Model (2). The results are qualitatively similar, while the coefficient on non-peers' cross-border acquisition performance is now insignificant.

Since my objective is to see whether the effect of learning from peers is related to the intensity of merger activities, I interact the merger wave dummy variable with the peers' acquisition performance variables in Models (3) and (4). The coefficients on the interactive terms are positive and significant, whereas the coefficients on peers' prior performance are now insignificant. This finding shows that the learning effect shown in Models (1) and (2) is primarily driven by inside-wave merger activities. In other words, firms have a strong tendency to follow their peers after observing successful deals within merger waves.

Overall, the results lend strong support for the learning hypothesis. Firms time their cross-border mergers based on how well their industry peers have executed deals in the same target country, and this phenomenon primarily occurs in merger waves.

1.4.6 Who are the first movers in a wave?

So far, my results suggest that mergers undertaken later in a wave benefit shareholders due to mitigated information asymmetry, possibly through learning from peers. Given this late-mover advantage, unresolved questions are, "Why are some firms

still willing to be early movers and how do these acquirers differ from late acquirers?" This section sheds light on factors that determine firms' acquisition timing within a wave. In particular, I examine the characteristics of acquirers at different stages of cross-border merger waves.

In Table 9, I estimate a probit model for the likelihood of being a first mover using acquiring firm variables, including size (total assets), market-to-book ratio, ROA, leverage, R&D, free cash flow, cash holdings, and firm age. I find that smaller and younger firms are more likely to enter early in a merger wave. Earlier work presents evidence that the degree of risk aversion increases in firm size. Smaller and younger firms striving to survive may act more aggressively, respond more swiftly to new opportunities, and accordingly become first movers. In contrast, larger and older firms are less motivated to assume significant risks at the early stage of a wave, given their likely greater market power and dominant position in the domestic market. Moreover, the cost of waiting is especially high for small firms, because they do not have sufficient resources and scale to merge and take advantage of growth opportunities as a late mover. If entering too late, the market will be occupied by large and established firms, with whom small entrants are incapable of competing. In addition, I find that early entrants have both lower leverage and lower cash holdings. These results are consistent with the notions that firms with lower leverage are more flexible, and firms holding less cash are less financially constrained, which increase their propensity to act promptly. My results also show that high R&D firms tend to be first entrants. This is consistent with prior literature that more innovative firms are more willing to take the lead in a new market because they seek differentiating strategies from their rivals (see, e.g., Lieberman and

Montgomery (1988) and Berry (2006)). I also find that firms with low market-to-book ratios are more likely to participate early in a wave. This may be explained by diminished growth opportunities in domestic markets, which induces them to actively seek opportunities abroad.

Overall, my results show that firm-level characteristics significantly influence the timing of participation in cross-border merger waves. Smaller and younger firms with lower leverage and high R&D have strong incentives to move first.

1.4.7 Economies of scale or learning?

A potential concern arising from my analysis is that the greater shareholder returns earned by late entrants may be attributable to observable firm characteristics (e.g., firm size) or even unobservable characteristics. In particular, given that larger firms tend to wait and jump in the wave later, I ask whether the observed late-bidder outperformance is caused by economies of scale (i.e., late bidders make larger acquisitions, which generate higher returns). If bidder size is a driving factor, I would expect to observe that larger late entrants outperform smaller late entrants.

To address this concern, I split all bidders into two classes based on the timing that their acquisitions are made: first movers and late movers. I then divide the two classes into large and small groups based on their own median firm size. In this way, I generate four samples: (1) small first movers and small late movers; (2) small first movers and large late movers; (3) large first movers and small late movers; and (4) large first movers and large late movers. I then run regressions to compare bidder performance at early and later stages within a wave for each sample. Results are reported in Table 10.

As seen in the table, larger late movers do not reap a significantly greater return. Instead, as shown in Model (2), small firms, indeed, benefit most from following their earlier peers. This is possibly because small firms' more aggressive actions but limited resources give them greater incentives to learn from peers. Not surprisingly, Models (3) and (4) find that learning is less likely to occur among firms of different sizes, possibly due to their different corporate objectives and strategies. Further, my results do not provide evidence that learning takes place among large firms. A possible explanation is that larger firms with richer resources and more established statures already have a great deal of experience; therefore, they are less motivated to learn because the advantage of additional learning is negligible.

1.5 Concluding remarks

In this paper, I study the valuation effects of cross-border merger waves from the US to 47 target countries between 1990 and 2010. I document that, similar to domestic merger waves, cross-border merger waves cluster by industry and time. Importantly, I show differences between in-wave and out-of-wave mergers and differences in mergers occurring in the early and late stage of waves. I find that mergers inside waves experience significantly greater performance (acquirer announcement returns, combined announcement returns, and post-merger operating performance) than mergers outside waves. I further find that late deals exhibit better performance than early deals within a merger wave, which is in stark contrast to evidence provided by domestic merger waves. Such late entrants' outperformance can be potentially explained by learning from peers' prior acquisition experience. Finally, I identify firm-specific characteristics that determine the timing of a firm's participation in waves.

My work contributes to the literature in several aspects. This is the first study to document the performance of cross-border mergers within and out of waves. Moreover, my study relates cross-border investment decisions to the real options literature and suggests that uncertainties are resolved through the mechanism of learning from industry peers. Additionally, my results draw inferences from the perspectives of public policy. Policymakers may adopt deregulation and privatization to encourage cross-border mergers and acquisitions. Overall, my results suggest that cross-border merger waves create value, which is consistent with the neoclassical hypothesis that mergers and acquisitions facilitate efficient reallocation of corporate resources.

Table 1 Number of cross-border M&As by acquirer industry-target country pair

Industry	AR	AS	AU	BL	BR	CA	CC	CE	CH	CO	CT	CY	DN	EN	ER	GR	HK	HU	ID	IN	IR	IS	IT	JP	LX	MA	MX	NO	NT	NZ	PE	PH	PL	PO	RU	SA	SG	SK	SP	SW	SZ	TH	TK	TW	UK	VE	VG	Total
1	23	1	42	17	54	163	4	7	19	7	0	1	3	6	55	2	16	4	3	16	9	6	31	11	0	2	45	5	28	12	5	2	5	1	9	18	5	3	17	9	19	2	3	1	187	5	53	931
2	9	7	14	6	16	80	7	0	18	1	0	0	5	5	32	0	7	0	1	4	3	1	33	5	1	1	22	1	12	1	0	0	8	2	0	5	0	7	12	11	7	2	1	2	104	2	81	531
3	24	15	93	20	84	422	16	14	61	7	0	0	39	15	169	1	18	3	0	29	21	10	109	23	2	10	46	22	75	20	3	4	12	7	12	14	14	21	41	42	41	4	10	10	459	6	285	2349
4	26	0	20	1	12	150	2	7	9	6	0	1	3	1	8	1	2	1	6	3	0	1	7	3	0	1	11	23	6	1	2	1	1	0	12	1	2	1	3	2	0	1	3	0	56	3	10	410
5	20	2	24	11	29	68	1	6	18	4	0	0	5	10	49	0	4	2	1	9	4	3	33	5	1	5	22	7	29	3	5	1	4	3	1	9	9	16	14	11	14	3	1	8	127	4	82	687
6	29	23	208	58	57	744	16	18	118	10	0	2	69	45	295	5	47	14	1	93	74	133	70	68	4	14	40	37	139	32	2	9	4	1	12	26	32	37	49	130	87	9	2	46	996	5	425	4325
7	18	3	28	5	16	65	5	7	11	1	0	0	2	1	18	0	10	5	1	4	8	6	1	2	1	0	19	7	10	2	4	0	2	0	3	2	4	3	6	11	11	2	2	0	100	1	24	431
8	9	0	8	1	3	40	2	4	7	5	0	0	0	2	5	0	2	0	0	1	1	0	3	1	1	0	5	5	2	3	3	2	0	0	0	0	1	1	5	0	2	2	1	1	25	1	5	159
9	9	6	41	18	14	269	9	3	15	1	0	0	8	8	65	1	18	3	4	4	11	7	22	7	1	1	36	8	23	19	1	3	3	8	2	4	11	5	12	11	15	1	5	4	180	3	78	952
10	18	5	50	22	14	124	3	3	23	1	2	0	14	8	87	0	2	6	1	24	21	34	47	15	0	1	11	8	32	5	3	0	3	2	10	4	7	7	19	37	47	0	0	3	193	3	111	1026
11	1	0	9	1	2	20	1	1	5	0	0	0	1	0	6	0	2	0	0	1	3	0	1	2	0	0	3	1	2	2	0	0	2	0	0	0	1	1	0	2	1	1	3	0	12	1	7	95
12	46	6	154	32	55	530	9	28	69	6	0	1	16	22	163	5	46	8	6	49	36	18	44	18	5	15	69	31	77	26	20	2	17	10	17	24	28	21	74	36	30	4	7	15	580	12	161	2688
Total	227	68	685	187	396	2775	75	93	368	49	2	5	165	123	932	15	199	46	24	237	191	229	401	161	15	50	329	155	435	126	48	24	61	34	78	102	114	123	252	302	274	31	38	90	3,019	46	1,323	14,584

Note: This table presents the number of cross-border mergers classified by acquiring industries and 47 target countries. The sample covers all announced and completed cross-border deals in the SDC database in which a US firm acquires a foreign target firm domiciled in one of 47 foreign countries from 1990 to 2010. The sample excludes leverage buyouts, spin-offs, recapitalizations, self-tender offers, exchange offers, repurchases, minority stake purchases, acquisitions of minority interest, and privatizations. The sample excludes government agencies and firms in the financial and utility industries. The rows represent acquiring industries. The columns represent target countries. The number of cross-border mergers by each industry into each target country is reported in the cell of the table. The Fama-French (FF) 12 industries are defined as follows: FF1 Consumer non durables; FF2 Consumer durables; FF3 Manufacturing; FF4 Energy; FF5 Chemicals and allied products; FF6 Business Equipment; FF7 Telephone and Television transmission; FF8 Utility; FF9 Wholesale, retail, and some services; FF10 Healthcare, Medical Equipment, and Drugs; FF11 Finance; FF12 Other.

Table 2 Cross-border merger waves at industry-level

Fama-French 12 industry codes	Target countries	Peak years	Number of acquisitions in the peak year
FF1 Consumer non durables	Canada	2002	12
	United Kingdom	1997	15
FF2 Consumer durables	United Kingdom	1998-99	13
	Germany	1997	14
FF3 Manufacturing	Australia	1998	12
	Brazil	1998	11
	Canada	2007	38
	China	2005-06	10
	French	1998	15
	Italy	1998	13
	Netherlands	1998	10
	United Kingdom	1998	49
	Germany	1996	26
FF4 Energy	Canada	2000-01	16
FF5 Chemicals and allied products	United Kingdom	1998	17
	Germany	1998	13
FF6 Business equipment	Australia	2000	23
	Brazil	2000	15
	Canada	2000	74
	China	2005	20
	French	1998	23
	India	2007	14
	Ireland	2000	11
	Israel	2000	19
	Japan	2000	10
	Netherlands	1999	15
	Sweden	2000	13
	Sweden	2007	13
	Singapore	1999	10
	United Kingdom	2000	81
	Germany	1998	36

Table 2 Continued

FF7 Telephone and Television transmission	Canada	2000	10
	United Kingdom	1998-99	14
FF9 Wholesale, retail, and some services	Canada	1997	29
	United Kingdom	1997	20
	Germany	1996	10
FF10 Healthcare, Medical Equipment, and Drugs	Canada	2006	11
	United Kingdom	2003	17
	Germany	2004	11
FF12 Other	Australia	2007	19
	Canada	2010	50
	China	2007	15
	French	1998	15
	Spain	2000	12
	United Kingdom	1998	64
	Germany	1998	18

Note: This table provides information on acquirer industries, target countries, and the peak year for each merger wave studied in the paper. Peak year is the year where the number of cross-border acquisitions is the largest over the entire sample period, 1990-2010. If two successive years have the same largest number of cross-border M&As over the sample period, they are both defined as a peak year.

Table 3 Descriptive statistics and correlations

Panel A. Descriptive statistics						
Variable	Mean	1st Quartile	Median	3rd Quartile	Std. Dev.	N
Deal value ($ million)						
All	170.87	7.92	27.01	100.00	675.70	3160
Within waves	157.31	7.50	27.00	90.00	700.87	1450
Outside waves	182.37	8.33	27.02	111.08	653.58	1710
Difference	-25.06	-0.83	-0.02	-21.08	47.29	
Relative size						
All	0.27	0.01	0.05	0.16	2.13	2810
Within waves	0.37	0.02	0.06	0.18	3.02	1303
Outside waves	0.18	0.01	0.04	0.13	0.78	1507
Difference	0.19**	0.01	0.02***	0.05	2.24	
% Stock payment						
All	24.01	0.00	0.00	40.49	38.57	1875
Within waves	27.34	0.00	0.00	56.80	40.62	946
Outside waves	20.61	0.00	0.00	27.01	36.08	929
Difference	6.73***	0.00	0.00***	29.79	4.54	
% Cash payment						
All	68.74	33.14	100.00	100.00	40.57	1842
Within waves	65.33	19.56	93.44	100.00	41.69	929
Outside waves	72.54	49.40	100.00	100.00	39.07	913
Difference	-7.21***	-29.84	-6.56***	0.00	2.62	
All stock deal						
All	0.15	0.00	0.00	0.00	0.36	1875
Within waves	0.18	0.00	0.00	0.00	0.39	946
Outside waves	0.13	0.00	0.00	0.00	0.33	929
Difference	0.05***	0.00	0.00***	0.00	0.06	
All cash deal						
All	0.52	0.00	1.00	1.00	0.50	1842
Within waves	0.49	0.00	0.00	1.00	0.50	929
Outside waves	0.56	0.00	1.00	1.00	0.50	913
Difference	-0.07***	0.00	-1.00***	0.00	0.00	
Mixed payment deal						
All	0.15	0.00	0.00	0.00	0.36	1844
Within waves	0.15	0.00	0.00	0.00	0.36	930
Outside waves	0.15	0.00	0.00	0.00	0.36	914
Difference	0.00	0.00	0.00	0.00	0.00	
Related M&A						
All	0.67	0.00	1.00	1.00	0.47	6755
Within waves	0.71	0.00	1.00	1.00	0.46	2820
Outside waves	0.64	0.00	1.00	1.00	0.48	3935
Difference	0.07***	0.00	0.00***	0.00	-0.02	
Public target						

Table 3 Continued

All	0.06	0.00	0.00	0.00	0.24	6755
Within waves	0.07	0.00	0.00	0.00	0.26	2820
Outside waves	0.05	0.00	0.00	0.00	0.22	3935
Difference	0.02***	0.00	0.00***	0.00	0.04	
Acquirer size						
All	6.83	5.40	6.82	8.25	2.04	6052
Within waves	6.58	5.09	6.55	7.89	2.05	2549
Outside waves	7.01	5.66	7.00	8.48	2.01	3503
Difference	-0.43***	-0.57	-0.45***	-0.59	0.04	
Acquirer M/B						
All	2.41	1.37	1.84	2.66	1.85	5884
Within waves	2.64	1.45	1.95	2.87	2.11	2459
Outside waves	2.24	1.33	1.74	2.50	1.62	3425
Difference	0.40***	0.12	0.21***	0.37	0.49	
Acquirer leverage						
All	0.17	0.02	0.14	0.25	0.17	6018
Within waves	0.15	0.00	0.11	0.24	0.17	2528
Outside waves	0.18	0.04	0.15	0.26	0.17	3490
Difference	-0.03***	-0.04	-0.04***	-0.02	0.00	
Acquirer ROA						
All	0.03	0.02	0.06	0.09	0.25	6044
Within waves	0.02	0.02	0.05	0.09	0.31	2543
Outside waves	0.04	0.03	0.06	0.09	0.20	3501
Difference	-0.02***	-0.01	-0.01***	0.00	0.11	
Stock price runup						
All	0.04	-0.20	-0.02	0.17	0.56	6733
Within waves	0.04	-0.19	-0.02	0.16	0.51	3919
Outside waves	0.04	-0.24	-0.04	0.18	0.62	2814
Difference	0.00	0.05	0.02***	-0.02	-0.11	

Table 3 Continued

Panel B. Correlations between deal and firm characteristics

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
[1]	Acquire CAR	1.000										
[2]	Deal value	-0.022	1.000									
[3]	Public target	-0.027**	0.202***	1.000								
[4]	% Cash payment	0.021	-0.014	-0.028	1.000							
[5]	% Stock payment	-0.017	0.018	0.061***	-0.889***	1.000						
[6]	Related M&A	0.001	0.034*	0.035***	-0.045*	0.029	1.000					
[7]	Acquirer size	-0.030**	0.278***	0.063***	0.341***	-0.303***	0.001	1.000				
[8]	Acquirer M/B	-0.008	-0.002	0.005	-0.296***	0.340***	0.067***	-0.109***	1.000			
[9]	Acquirer leverage	0.008	0.045**	0.022*	0.141***	-0.152***	-0.025*	0.165***	-0.230***	1.000		
[10]	Acquirer ROA	-0.005	0.048**	-0.003	0.185***	-0.187***	0.004	0.174***	-0.022*	-0.015	1.000	
[11]	Relative size	-0.025	0.054***	0.036*	-0.146***	0.163***	-0.003	-0.144***	0.181***	-0.052***	-0.066***	1.000

Table 3 Continued

Note: This table reports summary statistics (Panel A) and Pearson correlation coefficients (Panel B) for the main sample. The sample covers all announced and completed cross-border deals in the SDC database in which a US firm acquires a foreign target firm domiciled in one of 47 foreign countries from 1990 to 2010. *Acquirer CAR (-3, +3)*, is the acquirer's cumulative abnormal stock return from 3 days before to 3 days after the announcement. *Deal value* is the transaction value reported by SDC. *Relative size* is the ratio of the transaction value to the acquirer's total assets in the prior year. *% stock payment* is the percentage of stake acquired. *% cash payment* is the percentage of cash payment. *Related M&A* is a dummy equal to one if the target firm is in the same Fama-French 12 industry as an acquirer. *Size* is the natural logarithm of the acquirer's total assets in the prior year. *M/B* is the ratio of the market value, to book value of assets in the prior year. *ROA* is the ratio of net income to total assets in the prior year. *Leverage* is the sum of the acquirer's long-term debt and short-term debt, all scaled by total assets in the prior year. *Sales growth* is sales in the prior year minus sales in the year before the prior year divided by sales in the year before the prior year. *Stock price runup* is the buy-and-hold cumulative abnormal returns (BHCAR) for acquirers from 210 days to 11 days before the announcement. *All cash deal* is a dummy equal to one if a deal is financed solely by cash. *All stock deal* is a dummy equal to one if a deal is financed solely by stock. *Mixed payment deal* is a dummy equal to one if a deal is financed by a mixture of cash and stock. *Public target* is a dummy equal to one if the target is a public firm. *Difference* is outside waves minus within waves. All variables except dummy variables are winsorized at the 1st and 99th percentile levels within year. I present the number of observations, the overall sample mean, median, standard deviation, 25th percentile, 75th percentile, minimum, and maximum. The significance level of the difference in medians is based on a Wilcoxon rank-sum test. The differences in means t-test assumes unequal variances across groups when a test of equal variances is rejected at the 10 percent level. I use ***, **, * to denote significance at the 1%, 5%, and 10% levels, respectively.

Table 4 Stock returns performance inside vs. outside cross-border merger waves

Panel A. Acquirer, target, and combined abnormal returns (in percentage)								
	All		Within waves		Outside waves		Difference	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Acquirer CAR (-3,+3)	0.766***	0.280***	1.096***	0.418***	0.529***	0.172**	0.567***	0.246*
Target CAR (-3, +3)	24.345***	18.434***	26.978***	20.980***	21.459***	17.216***	5.519*	3.764
Combined CAR(-3,+3)	1.457***	1.270***	1.283*	1.061*	1.646***	1.550**	-0.363	-0.489

Table 4 Continued

Panel B. Multivariate regression analysis				
	Dependent variable			
	Acquirer CAR	Combined CAR	Acquirer CAR	Combined CAR
Independent variable	(1)	(2)	(3)	(4)
Within waves	0.762***	2.703***	0.814***	2.556*
	(3.16)	(2.95)	(3.85)	(1.78)
Firm-/deal-characteristics				
Size	-0.159**	-0.528	-0.157*	-0.576
	(-2.00)	(-0.92)	(-1.87)	(-1.04)
M/B	-0.010	-0.019	-0.001	-0.158
	(-0.10)	(-0.13)	(-0.01)	(-0.92)
ROA	0.379	4.945**	0.321	5.604*
	(1.04)	(2.00)	(1.05)	(1.65)
Leverage	0.763	2.613	0.703	4.197
	(0.76)	(0.50)	(0.68)	(0.74)
Sales growth	-0.282	3.667	-0.007	2.805
	(-0.73)	(1.22)	(-0.01)	(0.91)
Stock price up	-0.153	0.260	-0.223	0.841
	(-0.47)	(0.37)	(-0.65)	(1.31)
Related M&A	0.197	-0.511	0.147	-0.649
	(0.79)	(-0.76)	(0.55)	(-0.78)
All cash deal	0.423	2.231**	0.355	2.950**
	(1.56)	(2.23)	(1.25)	(2.63)
Public target	-1.191*	0.000	-1.150	0.000
	(-1.67)	(0.26)	(-1.53)	(0.19)
Relative size		1.623		2.088
		(0.65)		(0.79)
Trend	-0.932	-5.056***	-0.858*	-4.279**
	(-1.51)	(-3.73)	(-1.67)	(-2.39)
Log(GDP per capita)	0.201	0.187	0.526	8.297
	(0.75)	(0.25)	(0.97)	(0.89)
GDP growth	-0.016***	-0.055	-0.014***	0.061
	(-3.69)	(-0.20)	(-2.65)	(0.15)
ΔStock market return	0.063	0.014	0.041	0.017
	(1.08)	(0.47)	(0.64)	(0.53)
ΔCurrency valuation	0.047	-0.024	0.066	0.171
	(0.30)	(-0.08)	(0.04)	(0.37)
Same religion	0.596**	-1.099		
	(2.48)	(-0.79)		
Gdistance	-0.141	1.464		
	(-0.42)	(0.93)		
Same language	-0.804*	0.782		
	(-1.90)	(0.34)		
Rule of law	-0.132	0.146		
	(-1.19)	(0.34)		
Common law	0.182	-3.644**		

Table 4 Continued

	(0.78)	(-2.57)		
Industry fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	No	No	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Standard error clustering	Industry	Industry	Industry	Industry
Obs.(industry-country-year)	5450	250	5669	250
R^2	0.01	0.24	0.02	0.31

Note: This table reports average and median acquirer abnormal returns (Panel A) and the coefficients of OLS regressions comparing acquisition performance inside and outside cross-border merger waves (Panel B). The dependent variable in Model (1), *acquirer CAR (-3, +3)*, is the acquirer's cumulative abnormal stock return from 3 days before to 3 days after the announcement. The dependent variable in model (2), *combined CAR (merger synergy)*, is the weighted average of acquirer's abnormal returns and target's abnormal returns from 3 days before to 3 days after the announcement date, in which weights are based on the market values of the acquirer and the target 50 days before the announcement. *Within wave* is a dummy equal to one if the cross-border deal takes place in a merger wave. *Size* is the natural logarithm of the acquirer's total assets in the prior year. *M*/*B* is the ratio of the market value, to book value of assets in the prior year. *ROA* is the ratio of net income to total assets in the prior year. *Leverage* is the sum of the acquirer's long-term debt and short-term debt, all scaled by total assets in the prior year. *Sales growth* is sales in the prior year minus sales in the year before the prior year divided by sales in the year before the prior year. *Stock price runup* is the buy-and-hold cumulative abnormal returns (BHCAR) for acquirers from 210 days to 11 days before the announcement. *Related M&A* is a dummy equal to one if the target firm is in the same Fama-French 12 industry as the acquirer. *All cash deal* is a dummy equal to one if a deal is financed solely by cash. *Public target* is a dummy equal to one if the target is a public firm. *Relative size* is the ratio of the transaction value to the acquirer's total assets in the prior year. *Trend* equals one in 1990 and increases by one for each year afterwards. *ΔStock market returns* is the difference between acquirer and target countries' stock market index returns from the prior year to the current year. *ΔCurrency valuation* is the difference in real bilateral US dollar exchange rates from the prior year to the current year between acquirer and target countries. *GDP growth* is the growth rate of the Gross Domestic Product (GDP) of the target country from the year before the prior year to the prior year. *Log* (*GDP per capita)* is the natural logarithm of the Gross Domestic Product per capita of the target country in the prior year. *Same language* is a dummy equal to one if acquiring country and target country speak the same language. *Same religion* is a dummy equal to one if acquiring country and target country share the same religion. *Gdistance* is the geographical distance between the capital of acquiring country and the capital of target country. *Common law* is a dummy equal to one if the target country is a common law origin country. *Rule of law* is the assessment of the law and order tradition in the target country generated by the country risk rating agency International Country Risk (ICR). *Difference* is outside waves minus within waves. The significance level of the difference in medians is based on a Wilcoxon rank-sum test. The differences in means t-test assumes unequal variances across groups when a test of equal variances is rejected at the 10 percent level. All variables except dummy variables are winsorized at the 1st and 99th percentile levels within year. Models (1) and (2) include acquirer industry and year fixed effects. Models (3) and (4) include acquirer industry, target country, and year fixed effects. I report *t*-statistics in parentheses below parameter estimates which are computed using robust standard errors clustered by acquirer industry. I use ***, **, * to denote significance at the 1%, 5%, and 10% levels, respectively.

Table 5 Post-merger operating performance inside vs. outside cross-border merger waves

	Dependent variable = Δ Operating performance			
	(t+1, t+3)	(t+1, t+4)	(t+1, t+3)	(t+1, t+4)
Independent variable	(1)	(2)	(3)	(4)
Within waves	0.010	0.007**	0.011**	0.008**
	(1.62)	(2.29)	(1.99)	(2.03)
Firm-/deal-characteristics				
Size	0.002	-0.0002	0.001	-0.001
	(0.58)	(-0.09)	(0.34)	(-0.31)
M/B	-0.008*	-0.005	-0.008*	-0.004
	(-1.90)	(-1.16)	(-1.66)	(-0.82)
Leverage	0.039	0.012	0.040	0.018
	(1.06)	(0.35)	(1.10)	(0.50)
Related M&A	0.007	0.012***	0.009	0.011**
	(0.83)	(2.73)	(0.99)	(2.37)
Log(GDP per capita)	0.016***	0.009*	0.020***	0.028***
	(3.59)	(1.79)	(3.05)	(2.85)
GDP growth	-0.001*	0.000	-0.001	0.000
	(-1.75)	(-0.83)	(-1.52)	(-0.66)
ΔStock market return	0.000	0.000	0.000	0.000
	(1.08)	(0.35)	(0.98)	(0.32)
ΔCurrency valuation	0.0003	0.0002	0.000	-0.0001
	(0.70)	(0.30)	(0.21)	(-0.14)
Same religion	-0.005	0.009		
	(-0.45)	(0.95)		
Gdistance	0.004**	-0.001		
	(2.07)	(-0.44)		
Same language	0.005	-0.015		
	(0.26)	(-0.70)		
Rule of law	0.0083***	0.0024		
	(3.05)	(0.64)		
Common law	-0.0025	0.0101		
	(-0.10)	(0.48)		
Industry fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	No	No	Yes	Yes
Standard error clustering	Industry	Industry	Industry	Industry
Obs.(industry-country-year)	4269	3865	4430	4007
R^2	0.013	0.009	0.017	0.017

Table 5 Continued

Note: This table reports the coefficients of OLS regressions comparing post-merger operating performance inside and outside cross-border merger waves. The dependent variable, *ΔOperating performance*, is the acquirer's operating performance in year t+3 (or year t+4) minus operating performance in year t+1, in which year t is the deal announcement year. Operating performance in year t is defined as net income before extraordinary items in year t scaled by net sales in year t (i.e., return on sales) minus the median of this ratio for firms in the same Fama-French 12 industry. *Within wave* is a dummy equal to one if the cross-border deal takes place in a merger wave. *Size* is the natural logarithm of the acquirer's total assets in the prior year. *M*/*B* is the ratio of the market value, to book value of assets in the prior year. Leverage is the sum of the acquirer's long-term debt and short-term debt, all scaled by total assets in the prior year. *Related M&A* is a dummy equal to one if the target firm is in the same Fama-French 12 industry as the acquirer. *ΔStock market returns* is the difference between acquirer and target countries' stock market index returns from the prior year to the current year. *ΔCurrency valuation* is the difference in real bilateral US dollar exchange rates from the prior year to the current year between acquirer and target countries. *GDP growth* is the growth rate of the Gross Domestic Product (GDP) of the target country from the year before the prior year to the prior year. *Log* (*GDP per capita)* is the natural logarithm of the Gross Domestic Product per capita of the target country in the prior year. *Same language* is a dummy equal to one if acquiring country and target country speak the same language. *Same religion* is a dummy equal to one if acquiring country and target country share the same religion. *Gdistance* is the geographical distance between the capital of acquiring country and the capital of target country. *Common law* is a dummy equal to one if the target country is a common law origin country. *Rule of law* is the assessment of the law and order tradition in the target country generated by the country risk rating agency International Country Risk (ICR). All variables except dummy variables are winsorized at the 1st and 99th percentile levels within year. Models (1) and (2) include acquirer industry fixed effects. Models (3) and (4) include acquirer industry and target country fixed effects. I report *t*-statistics in parentheses below parameter estimates which are computed using robust standard errors clustered by acquirer industry. I use ***, **, * to denote significance at the 1%, 5%, and 10% levels, respectively.

Table 6 Stock returns performance for first movers vs. late movers within cross-border merger waves

Panel A. Acquirer, target, and combined abnormal returns (in percentage)								
	All		First movers		Late movers		Difference	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Acquirer CAR (-3, +3)	1.096***	0.418***	0.077	-0.216	1.339***	0.605***	-1.262***	-0.821***
Target CAR (-3, +3)	26.978***	20.980***	17.671***	6.756***	28.714***	21.691***	-11.043**	-14.935
Combined CAR (-3, +3)	1.283*	1.061*	-0.178	0.422	1.560**	1.108**	-1.738	-0.686

Table 6 Continued

Panel B. Multivariate regression analysis								
	Dependent variable							
	Acquirer CAR	Combined CAR	Acquirer CAR	Combined CAR	Acquirer CAR	Combined CAR	Acquirer CAR	Combined CAR
Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
First movers	-1.874**	-4.222**	-1.841**	-3.587*	-1.744**	-2.785*	-1.704**	-2.663
	(-2.19)	(-2.32)	(-2.40)	(-1.81)	(-2.15)	(-1.75)	(-2.39)	(-1.25)
First movers*Different					-1.814***	-19.840***	-2.023***	-11.527***
					(-2.79)	(-7.04)	(-3.07)	(-2.60)
Different					1.178	26.686***	7.866***	32.354**
					(0.20)	(2.94)	(5.97)	(2.30)
Firm-/deal – characteristics								
Size	-0.166*	-1.398	-0.167*	-1.163	-0.166*	-1.506*	-0.175**	-1.194
	(-1.85)	(-1.57)	(-1.86)	(-1.32)	(-1.85)	(-1.73)	(-2.00)	(-1.39)
M/B	0.139**	0.060	0.147**	-0.198	0.138**	-0.025	0.143**	-0.267
	(2.39)	(0.33)	(2.51)	(-0.76)	(2.39)	(-0.15)	(2.42)	(-1.06)
ROA	-0.039	5.098***	-0.029	5.024**	-0.029	5.641***	-0.032	5.402**
	(-0.19)	(3.14)	(-0.12)	(2.07)	(-0.14)	(3.84)	(-0.13)	(2.37)
Leverage	0.747	5.028	0.590	2.010	0.750	4.891	0.781	1.805
	(0.49)	(0.67)	(0.38)	(0.33)	(0.49)	(0.69)	(0.51)	(0.30)
Relative size		-2.329		-1.462		-3.218		-1.853
		(-1.01)		(-0.43)		(-1.34)		(-0.52)
Sales growth	-0.602	2.124	-0.618	3.834	-0.600	1.931	-0.612	3.984
	(-1.33)	(0.47)	(-1.48)	(0.72)	(-1.32)	(0.47)	(-1.46)	(0.74)
Stock price runup	-0.454	0.100	-0.425	0.592	-0.448	0.405	-0.443	0.754
	(-1.25)	(0.09)	(-1.16)	(0.50)	(-1.23)	(0.38)	(-1.23)	(0.62)
Related M&A	-0.403	-2.077*	-0.439	-2.098	-0.404	-2.536*	-0.430	-2.344*

Table 6 Continued

	(-0.80)	(-1.67)	(-0.85)	(-1.51)	(-0.80)	(-1.84)	(-0.82)	(-1.65)
Public target	-2.520***	0.000	-2.545***	0.000	-2.507***	0.000	-2.546***	0.000
	(-3.02)	(0.21)	(-3.03)	(0.17)	(-3.00)	(1.34)	(-3.04)	(1.28)
All cash deal	1.288***	4.399***	1.403***	4.256***	1.294***	4.177***	1.384***	4.124***
	(4.13)	(2.94)	(4.11)	(3.86)	(4.15)	(2.81)	(4.03)	(3.98)
Trend	-2.244**	-7.210*	-2.414**	-11.235***	-2.182**	-0.780	-2.221**	-8.102**
	(-2.19)	(-1.90)	(-2.12)	(-3.57)	(-2.12)	(-0.15)	(-1.97)	(-2.26)
Log(GDP per capita)	0.042	45.248**	0.217	2.957***	0.117	52.124***	0.098	5.000***
	(0.02)	(2.55)	(0.76)	(2.68)	(0.05)	(3.01)	(0.33)	(3.70)
GDP growth	0.086*	-0.761	0.112***	-0.513	0.090**	0.041	0.137***	-0.090
	(1.83)	(-1.02)	(4.04)	(-0.77)	(1.95)	(0.04)	(4.38)	(-0.12)
ΔStock market return	0.017***	-0.137	0.021***	-0.091	0.017***	-0.105	0.022***	-0.072
	(5.08)	(-1.38)	(8.76)	(-0.91)	(5.38)	(-1.04)	(10.26)	(-0.74)
ΔCurrency valuation	0.164***	-0.478	0.196***	-0.366	0.169***	0.428	0.229***	0.100
	(3.50)	(-0.64)	(12.28)	(-0.51)	(3.79)	(0.43)	(13.83)	(0.12)
Same religion			0.901	-32.988**			2.77***	0.000
			(1.23)	(-2.26)			(10.01)	(1.43)
Gdistance			-0.865	7.547			0.294	5.674
			(-1.23)	(1.43)			(0.41)	(1.13)
Same language			-0.609	14.261			2.149**	11.611
			(-0.91)	(1.62)			(2.31)	(1.36)
Rule of law			-0.180	4.331			0.653***	3.228
			(-0.85)	(1.46)			(2.32)	(1.09)
Common law			-1.273***	-11.374***			-3.516***	-1.902***
			(-5.00)	(-3.37)			(-5.18)	(-3.18)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 6 Continued

Country fixed effects	Yes	Yes	No	No	Yes	Yes	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Standard errors clustering	Industry	Industry	Industry	Industry	Industry	Industry	Industry	Industry
Obs.(industry-country-year)	2412	134	2345	134	2413	134	2345	134
R	0.04	0.49	0.04	0.37	0.04	0.52	0.04	0.39

Note: This table reports average and median acquirer abnormal returns (Panel A) and the coefficients of OLS regressions (Panel B) comparing acquisition performance for first movers and late movers within cross-border merger waves. The dependent variables in Model (1) and (2), *acquirer CAR (-3, +3)*, are acquirer's cumulative abnormal stock return from 3 days before to 3 days after the announcement. The dependent variables in model (3) and (4), *combined CAR (merger synergy)*, are the weighted average of acquirer's abnormal returns and target's abnormal returns from 3 days before to 3 days after the announcement date, where weights are based on the market values of the acquirer and the target 50 days before the announcement. *First mover* is a dummy equal to one if the deal belongs to the first 20% of acquisitions during a merger wave. *Different* is a dummy equal to one if the target country belongs to the top quartile of countries which are most culturally/economically distant from the US *Size* is the natural logarithm of the acquirer's total assets in the prior year. *M/B* is the ratio of the market value, to book value of assets in the prior year. *ROA* is the ratio of net income to total assets in the prior year. *Leverage* is the sum of the acquirer's long-term debt and short-term debt, all scaled by total assets in the prior year. *Sales growth* is sales in the prior year minus sales in the year before the prior year divided by sales in the year before the prior year. *Stock price runup* is the buy-and-hold cumulative abnormal returns (BHCAR) for acquirers from 210 days to 11 days before the announcement. *Related M&A* is a dummy equal to one if the target firm is in the same Fama-French 12 industry as an acquirer. *All cash deal* is a dummy equal to one if a deal is financed solely by cash. *Public target* is a dummy equal to one if the target is a public firm. *Relative size* is the ratio of the transaction value to the acquirer's total assets in the prior year. *Trend* equals one in 1990 and increases by one for each year afterwards. *ΔStock market returns* is the difference between acquirer and target countries' stock market index returns from the prior year to the current year. *ΔCurrency valuation* is the difference in real bilateral US dollar exchange rates from the prior year to the current year between acquirer and target countries. *GDP growth* is the growth rate of the Gross Domestic Product (GDP) of the target country from the year before the prior year to the prior year. *Log(GDP per capita)* is the natural logarithm of the Gross Domestic Product per capita of the target country in the prior year. *Same language* is a dummy equal to one if acquiring country and target country speak the same language. *Same religion* is a dummy equal to one if acquiring country and target country share the same religion. *Gdistance* is the geographical distance between the capital of acquiring country and the capital of target country. *Common law* is a dummy equal to one if the target country is a common law origin country. *Rule of law* is the assessment of the law and order tradition in the target country generated by the country risk rating agency International Country Risk (ICR). *Difference* is first movers minus late movers. The significance level of the difference in medians is based on a Wilcoxon rank-sum test. The differences in means t-test assumes unequal variances across groups when a test of equal variances is rejected at the 10 percent level. All variables except dummy variables are winsorized at the 1st and 99th percentile levels within year. Models (1), (2), (5), and (6) include acquirer industry, target country, and year fixed effects. Models (3), (4), (7), and (8) include acquirer industry and year fixed effects. I report *t*-statistics in parentheses

Table 6 Continued

below parameter estimates which are computed using robust standard errors clustered by acquirer industry. I use ***, **, * to denote significance at the 1%, 5%, and 10% levels, respectively.

Table 7 Operating performance for first movers vs. late movers within cross-border merger waves

	Dependent variable = ΔOperating performance			
	(t+1, t+3)	(t+1, t+4)	(t+1, t+3)	(t+1, t+4)
Independent variable	(1)	(2)	(3)	(4)
First movers	-0.036*	-0.015	-0.030*	-0.008
	(-1.93)	(-1.23)	(-1.66)	(-0.78)
First movers*Different			-0.151***	-0.197***
			(-6.92)	(-14.40)
Different			-0.062	-0.018
			(-0.59)	(-0.60)
Firm-/deal – characteristics				
Size	-0.002	-0.005**	-0.002	-0.005**
	(-1.01)	(-2.18)	(-0.97)	(-2.09)
M/B	-0.017***	-0.002	-0.017***	-0.002
	(-6.12)	(-0.58)	(-6.05)	(-0.59)
Leverage	-0.025	-0.055	-0.026	-0.058
	(-0.53)	(-0.88)	(-0.55)	(-0.91)
Related M&A	-0.002	-0.008	-0.002	-0.008
	(-0.12)	(-1.45)	(-0.11)	(-1.46)
Log(GDP per capita)	-0.055	-0.006	-0.053	-0.006
	(-1.44)	(-0.23)	(-1.36)	(-0.26)
GDP growth	-0.001	-0.001	-0.002	-0.001
	(-1.02)	(-0.67)	(-1.05)	(-0.88)
ΔStock market return	0.0000	-0.0001	0.0000	0.0000
	(-0.24)	(-0.48)	(0.02)	(-0.04)
ΔCurrency valuation	-0.0001	-0.0004	0.0003	0.0001
	(-0.04)	(-0.39)	(0.15)	(0.08)
Industry fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Standard errors clustering	Industry	Industry	Industry	Industry
Obs.(industry-country-year)	1787	1631	1787	1631
R	0.041	0.022	0.423	0.025

Note: This table reports the coefficients of OLS regressions comparing post-merger operating performance for first movers and late movers within cross-border merger waves. The dependent variable, *Operating performance*, is the acquirer's operating performance in year t+3 (or year t+4) minus operating performance in year t+1, in which year t is the deal announcement year. *Operating performance* in year t is defined as net income before extraordinary items in year t scaled by net sales in year t (i.e., return on sales) minus the median

Table 7 Continued

of this ratio for firms in the same Fama-French 12 industry. *First mover* is a dummy equal to one if the deal belongs to the first 20% of acquisitions during a merger wave. *Different* is a dummy equal to one if the target country belongs to the top quartile of countries which are most culturally/economically distant from the US *Size* is the natural logarithm of the acquirer's total assets in the prior year. *M/B* is the ratio of the market value, to book value of assets in the prior year. *Leverage* is the sum of the acquirer's long-term debt and short-term debt, all scaled by total assets in the prior year. *Related M&A* is a dummy equal to one if the target firm is in the same Fama-French 12 industry as an acquirer. *ΔStock market returns* is the difference between acquirer and target countries' stock market index returns from the prior year to the current year. *ΔCurrency valuation* is the difference in real bilateral US dollar exchange rates from the prior year to the current year between acquirer and target countries. *GDP growth* is the growth rate of the Gross Domestic Product (GDP) of the target country from the year before the prior year to the prior year. *Log(GDP per capita)* is the natural logarithm of the Gross Domestic Product per capita of the target country in the prior year. *Same language* is a dummy equal to one if acquiring country and target country speak the same language. *Same religion* is a dummy equal to one if acquiring country and target country share the same religion. *Gdistance* is the geographical distance between the capital of acquiring country and the capital of target country. *Common law* is a dummy equal to one if the target country is a common law origin country. *Rule of law* is the assessment of the law and order tradition in the target country generated by the country risk rating agency International Country Risk (ICR). All variables except dummy variables are winsorized at the 1st and 99th percentile levels within year. All models include acquirer industry and target country fixed effects. I report *t*-statistics in parentheses below parameter estimates which are computed using robust standard errors clustered by acquirer industry. I use ***, **, * to denote significance at the 1%, 5%, and 10% levels, respectively.

Table 8 The effect of learning from peers on cross-border M&A activities

Independent variable	(1)	(2)	(3)	(4)
Peer effects				
Peer CAR(t-1)	0.005***		-0.002	
	(0.01)		(0.60)	
Peer CAR (t-1)*Within wave			0.009**	
			(0.03)	
Peer CAR (t-2 to t-1)		0.004**		-0.001
		(0.04)		(0.72)
Peer CAR (t-2 to t-1)*Within wave				0.007*
				(0.06)
Non-peer effects				
Non-Peer CAR (t-1)	0.007**		0.001	
	(0.04)		(0.81)	
Non-peer CAR (t-1) *Within wave			0.011	
			(0.15)	
Non-Peer CAR(t-2 to t-1)		0.005		0.005
		(0.23)		(0.34)
Non-Peer CAR(t-2 to t-1)*Within wave				0.004
				(0.66)
Within wave			0.462***	0.479***
			(0.00)	(0.00)
Macroeconomic variables				
ΔGDP per capita	-0.348***	-0.505***	-0.263***	-0.406***
	(0.00)	(0.00)	(0.02)	(0.00)
ΔGDP growth rate	-0.002	0.001	-0.001	0.003
	(0.47)	(0.61)	(0.68)	(0.31)
ΔStock market return	0.012	0.014	0.031	0.011
	(0.62)	(0.79)	(0.38)	(0.56)
ΔCurrency valuation	-0.002	-0.003	-0.003	-0.004
	(0.55)	(0.23)	(0.45)	(0.12)
Industry fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Standard errors clustering	Industry	Industry	Industry	Industry
obs. (industry-country-quarter)	3050	4752	3050	4752
Log likelihood	-5500.1	-7768.51	-5500.1	-7589.16

Table 8 Continued

Note: This table reports estimates from poisson regressions where the dependent variable is the number of M&As from a given Fama-Fench 12 industry to the target country in a given year. The explanatory variables are as follows. *Peer CAR (t-1)* is the average CAR of Cross-border M&As undertaken by the same Fama-French 12 industry acquirers in the same target country in the quarter prior to the deal of interest. *Peer CAR (t-2 to t-1)* is the average CAR of Cross-border M&As undertaken by the same Fama-French 12 industry acquirers in the same target country in the previous two quarters prior to the deal of interest. *Non-peer CAR* is the average CAR of Cross-border M&As undertaken by firms from all other industries based on Fama-French 12 industry classification into the same target country. *Within wave* is a dummy equal to one if the cross-border deal takes place in a merger wave. *ΔGDP per capita* is the difference between acquirer and target countries' annual Gross Domestic Product per capita in the prior year. *ΔGDP growth rate* is the difference between acquirer and target countries' annual growth rate of the Gross Domestic Product (GDP) from the year before the prior year to the prior year. *ΔStock market returns* is the difference between acquirer and target countries' stock market index returns from the prior year to the current year. *ΔCurrency valuation* is the difference in real bilateral US dollar exchange rates from the prior year to the current year between acquirer and target countries. All variables except dummy variables are winsorized at the 1st and 99th percentile levels within year. All regressions include acquirer industry, target country, and year fixed effects. I report p-value in parentheses below parameter estimates. I use ***, **, * to denote significance at the 1%, 5%, and 10% levels, respectively.

Table 9 What determines first movers vs. late movers?

Independent variable	(1)
Bidder characteristics	
Size	-0.034*
	(0.09)
M/B	-0.037**
	(0.02)
Δ market share	0.091***
	(0.00)
ROA	0.296
	(0.32)
Leverage	-0.606***
	(0.01)
R&D	2.187***
	(0.00)
Free cash flow	0.255
	(0.55)
Cash holding	-0.471***
	(0.00)
Firm age	-0.332***
	(0.00)
Standard errors clustering	Industry
Obs.(industry-country-year)	1993
Seudo R	0.102

Note: This table reports the coefficients of a probit model estimating the likelihood of being a first mover. The dependent variable, *First mover*, is a dummy equal to one if the deal belongs to the first 20% of acquisitions undertaken during a merger wave. *Size* is the natural logarithm of the acquirer's total assets in the prior year. *M/B* is the ratio of the market value, to book value of assets in the prior year. Δ *Market share* is industry-adjusted sales growth from the prior year to the current year. *ROA* is the ratio of net income to total assets in the prior year. *Leverage* is the sum of the acquirer's long-term debt and short-term debt, all scaled by total assets in the prior year. *R&D* is the ratio of R&D expense to sales in the prior year. *Free cash flow* is operating income before depreciation - interest expenses - income taxes - capital expenditures, scaled by total assets in the prior year. *Cash holding* is the sum of cash and short-term investments, all scaled by total assets in the prior year. *Firm age* is the natural logarithm of years since the first year the firm appears on the CRSP tapes. All variables except dummy variables are winsorized at the 1st and 99th percentile levels within year. I report *p*-value in parentheses below parameter estimates which are computed using robust standard errors clustered by acquirer industry. I use ***, **, * to denote significance at the 1%, 5%, and 10% levels, respectively.

Table 10 Merger performance for first movers vs. late movers across different size groups

	All bidders	Small bidders	Small first/ Large late	Large first/ Small late	Large bidders
Independent variable	(1)	(2)	(3)	(4)	(5)
First mover	-1.874**	-4.186***	-1.060	-0.952	0.088
	(-2.19)	(-3.75)	(-0.66)	(-1.01)	(0.14)
Firm-/deal-characteristics					
Size	-0.166*	-0.527	0.062	-0.548	0.056
	(-1.85)	(-1.11)	(0.37)	(-1.37)	(0.37)
M/B	0.139**	0.200***	0.069	0.178**	-0.037
	(2.39)	(2.65)	(1.22)	(2.38)	(-0.65)
ROA	-0.039	0.026	1.284***	-0.254	1.101
	(-0.19)	(0.11)	(2.58)	(-1.22)	(0.55)
Leverage	0.747	1.596	-0.147	2.660	-0.293
	(0.49)	(0.66)	(-0.08)	(1.12)	(-0.18)
Sales growth	-0.602	-0.535	-2.862***	-0.455	-2.235***
	(-1.33)	(-1.00)	(-3.69)	(-0.76)	(-5.27)
Stock price runup	-0.454	-0.753	0.744***	-0.882*	0.307
	(-1.25)	(-1.34)	(2.69)	(-1.68)	(0.55)
Related M&A	-0.403	-0.508	0.057	-0.779	-0.327
	(-0.80)	(-0.49)	(0.16)	(-0.80)	(-0.89)
Public target	-2.520***	-3.657*	-1.700*	-3.445***	-1.897**
	(-3.02)	(-1.90)	(-1.70)	(-2.78)	(-2.31)
All cash deal	1.288***	1.183*	1.092**	1.805***	1.331**
	(4.13)	(1.94)	(2.08)	(3.51)	(2.32)
Trend	-2.244**	-4.020**	-1.092**	-3.544*	-0.976
	(-2.19)	(-2.07)	(-2.08)	(-1.80)	(-1.07)
Log(GDP per capita)	0.042	1.158	-1.629	1.582	-1.095
	(0.02)	(0.38)	(-1.05)	(0.41)	(-0.50)
GDP growth	0.086*	0.097	0.045	0.161**	0.070
	(1.83)	(1.10)	(0.49)	(2.00)	(0.83)
ΔStock market return	0.017***	0.010	0.014	0.022***	0.013
	(5.08)	(1.09)	(1.37)	(2.88)	(1.64)
ΔCurrency valuation	0.164***	0.190***	0.078	0.275***	0.116
	(3.50)	(2.83)	(0.64)	(5.16)	(1.22)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Standard error clustering	Industry	Industry	Industry	Industry	Industry
Obs.(industry-country-year)	2412	1198	1208	1204	1214
R^2	0.04	0.06	0.05	0.06	0.05

Table 10 Continued

Note: This table reports OLS regressions where both first movers and late movers are sorted by firm size. The dependent variable, *acquirer CAR (-3, +3)*, is acquirer's cumulative abnormal stock return from 3 days before to 3 days after the announcement. Model (1) includes the overall sample. Model (2) restricts first movers to small firms and late movers to small firms. Model (3) restricts first movers to small firms and late movers to large firms. Model (4) restricts first movers to large firms and late movers to small firms. Model (5) restricts first movers to large firms and late movers to large firms. *Small firm* is defined as a firm whose size is below median. *Large firm* is defined as a firm whose size is above the median. *First mover* is a dummy equal to one if the deal belongs to the first 20% of acquisitions during a merger wave. *Size* is the natural logarithm of the acquirer's total assets in the prior year. *M/B* is the ratio of the market value, to book value of assets in the prior year. *ROA* is the ratio of net income to total assets in the prior year. *Leverage* is the sum of the acquirer's long-term debt and short-term debt, all scaled by total assets in the prior year. *Sales growth* is sales in the prior year minus sales in the year before the prior year divided by sales in the year before the prior year. *Stock price runup* is the buy-and-hold cumulative abnormal returns (BHCAR) for acquirers from 210 days to 11 days before the announcement. *Related M&A* is a dummy equal to one if the target firm is in the same Fama-French 12 industry as an acquirer. *All cash deal* is a dummy equal to one if a deal is financed solely by cash. *Public target* is a dummy equal to one if the target is a public firm. *Relative size* is the ratio of the transaction value to the acquirer's total assets in the prior year. *Trend* equals one in 1990 and increases by one for each year afterwards. *ΔStock market returns* is the difference between acquirer and target countries' stock market index returns from the prior year to the current year. *ΔCurrency valuation* is the difference in real bilateral US dollar exchange rates from the prior year to the current year between acquirer and target countries. *GDP growth* is the growth rate of the Gross Domestic Product (GDP) of the target country from the year before the prior year to the prior year. *Log (GDP per capita)* is the natural logarithm of the Gross Domestic Product per capita of the target country in the prior year. *Same language* is a dummy equal to one if acquiring country and target country speak the same language. *Same religion* is a dummy equal to one if acquiring country and target country share the same religion. *Gdistance* is the geographical distance between the capital of acquiring country and the capital of target country. *Common law* is a dummy equal to one if the target country is a common law origin country. *Rule of law* is the assessment of the law and order tradition in the target country generated by the country risk rating agency International Country Risk (ICR). All variables except dummy variables are winsorized at the 1st and 99th percentile levels within year. All regressions include acquirer industry, year, and target country fixed effects. I report *t*-statistics in parentheses below parameter estimates which are computed using robust standard errors clustered by acquirer industry. I use ***, **, * to denote significance at the 1%, 5%, and 10% levels, respectively.

CHAPTER 2

HUMAN CAPITAL RELATEDNESS AND MERGERS AND ACQUISITIONS

2.1 Introduction

The property rights theory of the firm argues that when contracts are incomplete the boundaries of the firm are determined by bringing together complementary assets under common ownership. As developed in Grossman and Hart (1986) and Hart and Moore (1990), ownership of complementary assets by a single firm can reduce opportunistic behavior and holdup problems that result from a world with incomplete contracting.[8] Rhodes-Kropf and Robinson (2008) extend this view of the firm to a theory of mergers and show that the merger of firms with complementary assets can explain why mergers pair firms with similar market-to-book ratios, i.e., like buys like. The notion that complementary assets also include complementary human capital, however, has generally been overlooked in the literature. Indeed, the focus has largely been directed at complementary real assets and associated product market synergies.[9]

This paper focuses on the human capital dimension of mergers and asks whether complementary human capital influences the likelihood of merger, combined announcement returns, and post-merger cash flows. We start by developing a measure of human capital relatedness between pairs of firms. Using data from the Occupational Employment Statistics (OES) of the Bureau of Labor Statistics (BLS) we construct a

[8] See Hart (1995, 1998) for syntheses of the implications of incomplete contracting and the property rights theory of the firm. Teece (1982, 1986) also argues that market imperfections can motive a theory of a diversified multiproduct firm that benefits from combining complementary assets, including infrastructure, technology, capabilities, and culture.

[9] See Andrade, Mitchell, and Stafford (2001) and Betton, Eckbo, and Thorburn (2008) for surveys of this literature. In an important recent contribution, Hoberg and Phillips (2010) show empirically that product market relatedness drives higher post-merger cash flows and sales growth.

firm's human capital profile based on the firm's industry segments and OES industry occupation profiles that measure the scope of employment activity in a given industry. A firm's human capital profile is a vector of occupation titles with elements equal to segment sales-weighted percentages of workers in a given occupation. We then construct a measure of human capital relatedness between merging firm pairs as the angular separation (or uncentered correlation) of their human capital profile vectors. This measure of association captures the pair-wise distance between the merging firms' human capital profile vectors and is is bounded between 0 and 1, with a larger value indicating a higher association.[10]

In probit regressions using a large sample of merging firm pairs and matching non-merging firm pairs, we find that the likelihood of merger is increasing in human capital relatedness. Three features of this relation are noteworthy. First, the relation between the likelihood of merger and human capital relatedness is nonlinear, suggesting that the benefits of human capital relatedness dissipate when firms have very similar employment profiles. Second, although asset complementarity as measured by the Hoberg and Phillips (2010) measure of product market relatedness also influences the likelihood of merger, it does not subsume the effect of human capital relatedness. Indeed, the separate effects of human capital relatedness and product market relatedness on merger likelihood are both economically strong. Third, we find evidence that human capital relatedness and product market relatedness are to some degree substitutes in that the positive effect of human capital relatedness on the likelihood of merger is attenuated when the merging firms have more similar products.

[10] Jaffe (1986) also uses angular separation to measure the proximity of firms' technology activities.

We find that combined acquiring and target firm announcement returns are strongly increasing in our measure of human capital relatedness. A one-standard deviation increase in human capital relatedness increases the combined firm announcement return by 0.56%, which is a 38% increase in the mean combined return. As with the likelihood of merger, we find a substitution effect between asset and labor complementarity on merger announcement returns.

Lastly, we examine the influence of human capital relatedness on post-merger operating performance. We find that industry-adjusted operating cash flows are significantly higher when acquirers purchase targets that have high pairwise similarity to the acquirer's human capital. In contrast, we find no evidence that asset complementarity as measured by product market similarity influences post-merger operating performance.

Our paper contributes to the existing literature in two respects. First, we develop a measure of human capital relatedness between pairs of firms that allows for an examination of the role of human capital in merger and acquisition decisions. Our measure may also be useful in examining the role of human capital in other types of corporate restructurings. Second, we show how human capital relatedness contributes to our understanding of both the likelihood and benefits of mergers and acquisitions. Our analysis contributes to the literature that examines asset complementarity and product market relatedness (e.g., Rhodes-Kropf (2008) and Hoberg and Phillips (2010)) by establishing that human capital relatedness is an economically significant factor which may substitute for product market relatedness in merger and acquisition decisions.

Our paper complements existing literature that examines the role of labor and human capital in finance. Reviving an old topic, several recent papers examine the role of

human capital in asset pricing.[11] Eisfeldt and Papanikolaou (2013) and Donangelo (2014) find that organization capital (i.e., the production factor embodied in key personnel) and labor mobility, respectively, are priced risks and significantly increase returns. The importance of human capital relative to other asset classes is supported by Palacios (2015), who estimates that the weight of human capital in aggregate wealth is over 90%. Much closer to our paper, Ouimet and Zarutskie (2012) find evidence that firms pursue mergers and acquisitions to acquire a larger work force.[12] In a recent paper, Tate and Yang (2015b) show that inter-industry worker mobility significantly influences merger and acquisition activity between industries.[13] They further find that labor productivity – as measured by the ratio of firm sales to employment or payroll – increases and the likelihood of divestiture decreases for firms involved in mergers and acquisitions between industries with high human capital transferability.

Lastly, our paper is related to the literature in strategy that draws on the resource-based view of the firm developed by Wernerfelt (1984). This view argues that a motivating factor behind M&A activity is to exchange firm-specific resources that are otherwise difficult to access because of high inter-firm transaction costs. This literature examines how the relatedness of worker skills and products (Farjoun (1994, 1998)), inter-industry labor mobility (Neffke and Henning (2013)), and marketing resources (Capron and Hulland (1999)) influence acquisition decisions.

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[11] See Mayers (1972) and Fama and Schwert (1977) for the classic articles on human capital and capital asset pricing.

[12] Also see Kole and Lehn (2000) for an analysis of how the complexities of workforce integration may destroy value in mergers.

[13] Tate and Yang (2015a) show that firms that operate in multiple industries have a real option to redeploy workers across their industry segments.

The remainder of the paper is organized as follows. Section 2 provides testable hypotheses for the impact of human capital on mergers and acquisitions. Section 3 describes the data and discusses the construction of the firm pair-wise human capital relatedness measure. Section 4 presents our empirical tests on the impact of human capital relatedness on the likelihood of merger, combined announcement returns, and post-merger profitability. Section 5 concludes.

2.2 Hypotheses

The property rights theory of the firm (Grossman and Hart (1986) and Hart and Moore (1990)) and in particular the extension of the theory to a theory of mergers by Rhodes-Kropf and Robinson (2008) predicts that complementary assets should be combined under common ownership in a world with incomplete contracting. The key implication is that when there are significant pair-wise complementarities between firms' assets, then synergy gains result from a merger. Since human capital is a significant component of firms' asset portfolios, the notion that asset complementarities can be a significant factor motivating mergers extends naturally to pair-wise complementarities between firms' human capital. We test two hypotheses for the role of human capital in mergers.

Hypothesis 1: Human Capital Similarity. The likelihood of two firms merging is increasing in the relatedness of their human capital.

Hypothesis 2: Synergies through Complementary Human Capital. Announcement returns and future operating cash flows are increasing in the relatedness of merging firms' human capital.

The key to testing the hypotheses is obtaining a measure of the similarity of firms' labor pools and incorporating the feature that many firms operate in more than one industry with possibly unique employment profiles. As discuss below, we construct human capital profile vectors for merging firms based on Occupational Employment Statistics (OES) of the Bureau of Labor Statistics (BLS) that are portfolios of firms' industry segment employment profiles. We then compute a measure for the distance between the merging firms' human capital profile vectors.

To insure that the influence of human capital relatedness on mergers and acquisitions is not attributable to a common correlation between human capital and real assets, it is important to control for merging firms' real asset relatedness. By the same token, it is naturally plausible that human capital and real asset complementarities jointly influence mergers and acquisitions either as complements or perhaps as substitutes. We therefore include a measure of asset complementarity in our tests developed by Hoberg and Phillips (2010, 2013) that measures product similarity. We use many other measures for asset complementarities (e.g., same 3- or 4-digit SIC codes) in our tests but the Hoberg and Phillips (2010, 2013) measure consistently outperforms all other measures, so we report results below using only their measure.

2.3 Data and Key Variables

2.3.1 Data Sources

Our sample begins with all U.S. domestic mergers and acquisitions (M&A) reported in Thompson Financial Securities Data Company (SDC) database during the period 1997 to 2013 and completed by the end of May 2014. To be included in our sample, we require that the deal is classified as a merger, an acquisition of majority

interest, or an acquisition of assets. These requirements result in an initial sample of 29,305 M&A deals.

In order to test the effects of human capital relatedness on post-merger outcomes, we require information on the acquirer and target's stock returns and firm characteristics. Thus, we further require that both the acquirer and the target have financial statement data reported in Compustat and stock returns available from the Center for Research in Security Prices (CRSP). This necessitates that both the acquirer and the target are publicly traded firms, and reduces the sample size to 1,474 M&A deals.

To measure human capital relatedness between merging firms, we start by constructing a human capital profile for each acquirer, target, and matching firms (discussed below). We do this by combining industry-level data from the Occupational Employment Statistics (OES) of the Bureau of Labor Statistics (BLS) with firm-level segment data from the Compustat Industry Segment (CIS) database. The OES occupation data are available from 1989 to 2013 with two caveats. First, there is no data in 1996, so we use data from 1995 for the missing data in 1996. Second, the OES occupation data tends to be sparse prior to 1997, which is why we start our merger sample in 1997.[14]

The OES data classify industries using three-digit Standard Industrial Classification (SIC) codes up through 2001 and four-digit North American Industry Classification System (NAICS) codes from 2002. The OES dataset includes 158 broad occupation titles based on OES taxonomy up through 1998 and 444 broad occupation titles based on the Standard Occupational Classification (SOC) taxonomy thereafter. For

[14] Since we use lagged values for most variables in our multivariate analysis – including the lagged value of human capital relatedness – we use OES data starting in 1996. All of our results are stronger if we instead use OES data starting in 1997 and thereby start our merger sample in 1998.

the years 1989 to 1998, we convert the OES taxonomy to the SOC taxonomy using the crosswalk provided by the National Crosswalk Service Center. For each 3-digit SIC code for years 1989-2001 and 4-digit NAICS code for years 2002-2013, we obtain an industry occupation profile that measures the scope of employment activity in a given industry. More specifically, for industry *i* we obtain an occupation profile vector $O_i = (O_{i1}, ..., O_{ik})$, where O_{ij} is the number workers in industry *i* assigned to occupation *j* divided by the total number of workers in industry *i* (i.e., O_{ij} is the proportion of workers in industry *i* assigned to occupation *j*).

We use the industry occupation profiles in conjunction with the industries in which a firm operates to construct a firm's human capital profile, H. When a sample firm is covered by the Compustat industry segment (CIS) database, we compute its human capital profile as the segment sales weight average of its industry occupation profiles, where a segment weight is segment sales to total segment sales and the industry occupation profile of a segment is matched based on 3-digit SIC codes up through 2001 and 4-digit NAICS codes thereafter.[15] When a sample firm is not covered by CIS, we instead use industry segment information from SDC. The SDC dataset provides 4-digit SIC codes and 6-digit NAICS codes for all segments of merging firms. The limitation, however, is that the SDC dataset does not provide segment sales or any other information that could be used to weight a firm's industry occupation profiles.[16] For this reason, when we use SDC for industry segment information, we compute a firm's human capital

[15] We exclude industry segments that are not covered by OES, and our calculation of human capital profile uses only remaining segments.
[16] Of course, this limitation is irrelevant if the firm has one segment (i.e., SDC reports a single SIC or NAICS code).

profile, H, as the equally-weighted average of its segments' industry occupation profiles.[17]

For the 1,474 M&A deals with CRSP and Compustat information, we are able to compute human capital profiles for 1,322 acquirer and target pairs.[18] Of these, in 1,045 pairs both the acquirer and target have CIS data, in 101 pairs only the acquirer has CIS data, in 153 pairs only the target has CIS data, and in 23 pairs neither the acquirer or target has CIS data. We use the number of segments reported in the SDC database and equal segment weights to compute a firm's human capital profile when it does not have CIS data.

2.3.2 Human capital relatedness

We construct a measure of human capital relatedness between merging firms *i* and *j* using the angular separation or uncentered correlation of their human capital profile vectors H_i and H_j.[19] Specifically, human capital relatedness, HCR_{ij} is computed as the scalar product of the firms' human capital profile vectors divided by the product of their lengths:

$$HCR_{ij} = \frac{H_i H'_j}{\sqrt{(H_i H'_i)(H_j H'_j)}}$$

This measure is bounded between 0 and 1. It is unity for merging firms whose human capital profiles are identical and zero for firms whose human capital profiles are

[17] Again, we exclude industries that are not covered by OES data.
[18] We lose 152 (1,474 − 1,322) deals because none of the segments of either the acquirer or target are covered by OES data.
[19] This measure of proximity has been used for example by Jaffe (1986) to measure the closeness of two firms' innovation activities.

orthogonal. Importantly, it is closer to unity for merging firms with more complementary human capital.

To illustrate the computation and interpretation of *HCR*, consider the acquisition of Summit American Television by E. W. Scripps Company. On December 19, 2003, an American media conglomerate, E. W. Scripps Company (EWS) announced a plan to buy Summit America Television (SAT). As shown below, the acquiring company, EWS, has four segments with different 4-digit NAICS codes. The largest segment has a NAICS code of 5151 (radio and television broadcasting) and its sales account for 47% of the firm's total sales. According to the

Acquirer: E. W. Scripps (EWS)			Target: Summit American TV (SAT)		
Segment NAICS	% sales	No. of job titles	Segment NAICS	% sales	No. of job titles
5151	47%	85	4541	100%	116
5111	44%	136			
5331	6%	147			
4541	3%	116			
Total	100%	160	Total	100%	116

Industry human capital profile from the Occupational Employment Statistics dataset provided by the Bureau of Labor Statistics, this industry has 85 different broad level occupation titles. The next largest segment, NAICS code 5111 (newspaper, periodical, book, and directory publishers), accounts for 44% of total sales and there are 136 job titles. The remaining segments, NAICS codes 5331 (lessors of nonfinancial intangible assets) and 4541 (electronic shopping and mail-order houses), account for only 6% and 3% of total firm sales and have 147 and 116 occuptation titles, respectively.[20]

[20] The industry represented by NAICS 5331 comprises establishments primarily engaged in assigning rights to assets, such as patents, trademarks, brand names and/or franchise agreements for which a royalty payment or licensing fee is paid to the holder of the asset.

We compute a human capital profile for EWS based on the segment industry-level human capital profiles and sales data. The human capital profile of EWS is a weighted average of the four segments' human capital profile vectors, where the weights are the percentage of sales. For example, consider the broad level occupation designer; an element in EWS's human capital profile vector.[21] The percentage of employees working in this occupation in NAICS codes 5151, 5111, 5331, and 4541 are 0.48%, 2.85%, 0.79%, and 0.76%, respectively. The designer element in EWS' human capital profile vector is then computed as (0.47)(0.48%) + (0.44)(2.85%) + (0.06)(0.79%) + (0.03)(0.76%) = 1.55%. Other vector elements – the percentage of EWS's workers holding other occupation titles – are similarly computed.

The target company, SAT, is a single-segment company. The firm's 4-digit NAICS 4541 has 116 different broad-level occupations. The firm's human capital profile vector is the same as the human capital profile of NAICS industry 4541, with vector elements equal to the percentage of employees working in each occupation.

The human capital relatedness (*HCR*) of EWS and SAT is the product of the merging firms' human capital profiles vectors scaled by the product of their lengths. The product is 112.51 and the lengths are 15 for EWS and 22.92 for SAT, so that *HCR* = 0.33. Note that the two firms share only one segment (NAICS 4541), and this segment represents only 3% of the acquirer's sales. In other words, the two firms appear unrelated in terms of product markets. Nevertheless, their *HCR* of 33% is clearly nontrivial. The reason, as illustrated in the designer occupation example above, is because different

[21] Designers (Occupation code 27-1020) include commercial and industrial designers (27-1021), fashion designers (27-1022), floral designers (27-1023), graphic designers (27-1024), interior designers (27-1025), merchandise displayers and window trimmers (27-1026), set and exhibit designers (27-1027), and designers, all others (27-1029).

industries have considerable overlap in their human capital. In other words, they may have complementary human capital despite having little or no complementary assets.[22]

2.3.3 Product market relatedness

When examining the impact of human capital relatedness on merger and acquisition decisions, it is important to control for product market relatedness through asset complementarities. Indeed, it is entirely possible that the human capital of firms (e.g., the array of different jobs titles necessary to support a firm's operations) is in no small measure explainable by the goods and services offered by the firm. As such, the influence of human capital relatedness on merger and acquisition decisions could at least in part be attributable to product market relatedness.

To control for product market relatedness, we use the publicly available measure of product market relatedness developed by Hoberg and Phillips (2010, 2013). Hoberg and Phillips process the texts of product descriptions in firm's 10-K annual filings from 1996 to 2011. Based on vectors of key words from these descriptions, they compute product similarity scores between all pairs of firms with 10-Ks in the SEC Edgar database and that have data in both CRSP and Compustat. The product similarity score between any two firms falls in the range from 0 to 1, with the score increasing as firms have more product description words in common. In an online data library, Hoberg and Phillips report firm pairs that have a product similarity score above a threshold established by requiring that for any randomly drawn pair of firms from the CRSP/Compustat universe the likelihood of the firms having the same 3-digit SIC code is equal to the likelihood of

[22] Appendix B has an additional example and discussion of the *HCR* measure.

them have a similarity score above the threshold.[23] We thus create a product market related dummy variable (*PMR*) equal to one for all firm pairs reported in the Hoberg and Phillips online data library that have a product market similarity score above the threshold.

As noted above, the Hoberg and Phillips data library contains firm pairs exceeding the threshold from 1996 to 2011. Since the key variables in our multivariate analysis are lagged one year, for each merger pair announced in year *t*, we use *PMR* in year *t*–1. This allows us to control for *PMR* while examining the influence of *HCR* on mergers announced up through 2012.

2.3.4 Other Control Variables

We control for a number of other variables in our multivariate tests. In particular, we control for the target-to-acquiring firm relative size, method of financing, and a large number of characteristics of the acquiring and target firms. The definitions of these variables along with definitions of HCR, PMR, acquiring/target announcement returns, and merger synergy are collected in Appendix A.

2.4 Mergers and Human Capital Relatedness

We first provide descriptive statistics. We then examine in turn the influence of human capital relatedness on likelihood of merger, announcement returns, and post-merger operating cash flows.

2.4.1 Descriptive Statistics

Panel A of Table 11 provides descriptive statistics for the sample of 1,322 acquirer and target firm pairs over the sample period from 1997 to 2012. Although we

[23] The Hoberg and Phillips data library can be found at http://cwis.usc.edu/projects/industrydata/. We thank them for making this data available.

have M&A data through 2013, as noted above, our sample stops in 2012 because Hoberg and Phillips (2010) product market relatedness data is available only up through 2011. All variables are winsorized at the 1st and 99th percentiles of their distributions except human capital relatedness (*HCR*), product market relatedness (*PMR*), and other dummy variables.

Recalling that HCR is increasing in human capital relatedness and has a maximum value of 1, the mean (median) HCR appears to be high at 0.75 (0.85). Thus we see already that merger pairs tend to have related human capital; at least for our sample.24 Further note that 50% of the mergers are classified as having related products according Hoberg and Phillips' (2010) text-based analysis of 10-K product descriptions (i.e., the dummy variable PMR has a mean of 0.50).

Average announcement returns (see Appendix A for computation details) are similar to those reported elsewhere.25 Over event windows spanning the announcement day, acquiring firms have negative announcement returns, targets earn large positive announcement returns, and the combined acquirer and target announcement returns are positive. The latter result suggests that M&A transactions on average create value.

The remainder of Panel A reports descriptive statistics for the deals and for acquirer and target characteristics. Observe that the average (median) relative size of the target to the acquirer – as measured by the market value of equity four days before the merger announcement date – is 0.24 (0.10), which indicates that the target's human capital profile will be a nontrivial fraction of the acquirer after the acquisition.

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[24] We are cautioned, however, that there is no basis to judge the relative magnitude of *HCR* since we are the first to use this measure of the similarity of merging firms' employment activities.
[25] See Andrade et al. (2001) and Betton et al. (2008) for surveys.

Panel B of Table 11 reports Pearson correlation coefficients between key variables. As seen there, the correlation between HCR and PMR is 0.24. The positive correlation is intuitively reasonable, given that firms' employment activities should map into product similarity. Thus, for example, if acquirer and target firms both have a significant number of workers operating printing presses we might expect that the firms have similar products (e.g., newspapers). By the same token, however, merging firms may have complementary human capital and yet relatively low product market similarity, as in the acquisition of Summit American Television by E. W. Scripps Company discussed above. Also note that the correlations between *HCR* and *PMR* and the various announcement returns are effectively zero – only one is significant at the 10% level. Thus, at least based on univariate results, the market does not appear to perceive human or product market synergies based on complementarities in employment activities or products.

2.4.2 Merger and Acquisition Likelihood

We test Hypothesis 1 that human capital relatedness is a motivating factor in merger decisions using a multivariate probit model that estimates the effect of *HCR* on the probability of merger. Table 12 reports marginal effects from probit regressions using our sample of merging firm pairs (acquirer and target) and a sample of non-merging control firm pairs. Each merging firm pair has one matching non-merging firm pair. The matching pair of firms is selected based on the number of segments, total assets, and market-to-book (*M*/*B*) ratio. For each acquirer (target) in year *t*, we identify five firms from the Compustat segment database in year *t* that have the closest number of segments and do not engage in M&A activity in years *t* and *t*–1. Among the five firms, we identify

the three firms that have the closest total assets. Lastly, of these three firms, we select the firm with the closest *M*/*B* ratio. Doing this procedure for each acquirer and target in a merger pair, we generate a matching sample of non-merging firm pairs.[26] Panel A reports regressions that use the unadjusted human capital relatedness measure (*HCR*) and Panel B reports regressions that use the orthogonalization of *HCR* against *PMR* (*HCR_ε*). For the latter, *HCR_ε* is the residual from a regression of *HCR* on *PMR*. All regressions include control variables for acquirer and target characteristics that are defined in Appendix A and all right-hand-side variables are measured at time *t*−1. Marginal effects are computed for a one-standard-deviation change for continuous variables and for a change from zero to one for dummy variables. We report *z*-values that test whether the underlying probit coefficients estimates are equal to zero in parentheses below the marginal effects. The z-values are computed using robust standard errors clustered by year.

Consistent with the prediction that human capital relatedness increases the likelihood of merger, we find a significantly positive effect of *HCR* and *HCR_ε* on the probability of merger in every model reported in Table 12. These effects are highly economically significant. Thus, based on the predicted probabilities of merger for model (1) in Panels A and B, a one-standard-deviation increase in *HCR* increases the probability of merger by 90% (47%/52%) and a one-standard-deviation increase in *HCR_ε* increases the probability of merger by 47% (24%/51%). The smaller effect for *HCR_ε* makes sense, because model (1) does not include product market relatedness (*PMR*) and we

[26] Our results are robust if we use a randomly-matched non-merging firm pair, if we alter the filter order to generate a non-merging firm pair (e.g., first match on M/B ratio, then total assets, and then number of segments), and if we use a propensity score model to generate a non-merging firm match for each acquirer and target.

know from Panel B of Table 11 that *HCR* and *PMR* are correlated, i.e., human capital relatedness and product market relatedness are themselves related.

The relation between *HCR* (*HCR_*ε) and the likelihood of merger is nonlinear as reflected in the negative marginal effect for squared *HCR* (*HCR_*ε) in models (2), (4), and (6) in Panel A (B). This suggests that there are decreasing returns to human capital complementarity. This makes sense because the benefits of human capital complementarity may be small or zero when firms have identical labor, and our measure of human capital relatedness reaches a maximum value of 1 when the employment profile vectors are identical.

Consistent with the results in Hoberg and Phillips (2010), the marginal effects of *PMR* on the likelihood of merger in regressions (3)-(6) in Panels A and B of Table 12 are economically large and the underlying coefficient estimates are highly statistically significant. Thus product market relatedness also significantly contributes to the likelihood of merger. Additionally, we see in models (5) and (6) that human capital relatedness and product market relatedness are to some degree substitutes in the sense that being classified as having highly related products (*PMR* = 1) attenuates the influence of *HCR* (*HCR_*ε) on the likelihood of merger. Thus, for example, in model (5) of Panel B, when *PMR* = 1 a one-standard-deviation increase in *HMR_*ε increases the probability of merger by a relatively modest 38% ([36% – 15%]/55%)

Table 12 also shows that mergers are more likely when acquiring firms have high market-to-book ratios and free cash flow and low leverage and cash holdings. No characteristic of targets reliably predicts mergers. In particular, we do not find evidence that more profitable acquirers and less profitable targets predicts merger as would be

suggested by the q-theory of mergers (Jovanovic and Rousseau (2002)). As such, our results are more consistent with the like buys like theory of mergers advanced by Rhodes-Kropf and Robinson (2008).

2.4.3 Announcement Returns

Table 13 tests Hypothesis 2 that firms derive synergy benefits from human capital complementarities in mergers and acquisitions by examining the effect of *HCR* on announcement return. The dependent variable Synergy (−1, +1) in models (1) and (4)-(8) is the weighted average of the cumulative abnormal returns of acquirer and target over days −1, 0, and +1, where day 0 is the merger announcement day. The weights are based on the market values of the equity of the acquirer and target four days prior to the merger announcement day. The dependent variables Acquirer (−1, +1) and Target (−1, +1) in models (2) and (3) are the cumulative abnormal returns of acquirer and target over the same event window. All regressions include controls for deal, acquirer, and target characteristics that are defined in Appendix A. Right-hand-side variables are measured at time *t*−1 except for relative size, stock deal dummy, and termination fee. Again, see Appendix A for details. We report *t*-statistics in parentheses below parameter estimates that are computed using robust standard errors clustered at the year level.

As seen in model (1), *HCR* has a significantly positive effect on the combined acquirer and target announcement return, which is consistent with Hypothesis 2.[27] The effects of *HCR* on the returns of acquirers and targets in models (2) and (3), respectively, are also positive but not statistically significant.

[27] The coefficient on squared *HCR* is never significant, so we do not include squared *HCR* in the models reported in Table 13.

Model (4) includes *PMR* and the interaction between *HCR* and *PMR* (*HCR* × *PMR*). The coefficients on *HCR* and *PMR* are both significantly positive, while the coefficient on the interaction between them is significantly negative. The implication is that merger announcement returns are higher if the merging firms have human capital relatedness or product market relatedness but not both. This is clearly illustrated for the effect of *HCR* on announcement returns in models (5) and (6) where we split the sample by whether *PMR* = 0 (model (5)) or *PMR* = 1 (model (6)). Observe that the coefficient on *HCR* is large and significantly positive when the merging firms' products have low product market relatedness (*PMR* = 0) but is essentially zero when the merging firms' products are related (*PMR* = 1). The implication is that synergy benefits – as measured by announcement returns – from either form of relatedness are accentuated when the merging firms have one or the other but not both.

Some back-of-the-envelope calculations reveal the extent to which human capital relatedness and product market relatedness are substitutes with respect to their impact on announcement returns. Using model (4), we compute the effect of a one-standard-deviation increase in *HCR* on combined merger announcement returns when *PMR* = 0 as 0.56% (1.989 × 0.283) and when *PMR* = 1 as –0.12% (1.989 × 0.283 – 2.414 × 0.283). Similar calculations for *PMR* illustrate the attenuation of the effect of *PMR* on announcement returns when merging firms have high human capital relatedness. Thus, the effect of *PMR* = 1 on combined merger announcement returns when *HCR* is at the 25th percentile of its distribution is 1.09% (2.455 – 2.414 × 0.565) and when *HCR* is at the 75th percentile of its distribution is 0.27% (2.455 – 2.414 × 0.905).

To check the robustness of our results, model (7) replaces *HCR* with the orthogonalization of *HCR* again *PMR* (*HCR_*ε) and model (8) is a robust regression that uses a two-step procedure to reduce the impact of outliers in the OLS regression.[28] As seen in the table, we continue to find that both human capital relatedness and product market relatedness have positive effects on merger announcement returns and that the two types of relatedness are substitutes. In unreported regressions we find that our results are also robust if we use wider windows around the announcement (i.e., –2 to +2 and –3 to +3).

Table 13 also shows that combined acquirer and target announcement returns are reliably increasing in the size of the target relative to the acquirer and leverage of acquirer, and decreasing in stock deals, market-to-book ratio of target, leverage of target, cash holdings of target, prior returns of acquirer, and whether the acquirer has a termination fee.

2.4.4 Post-Merger Operating Performance

Table 14 tests Hypothesis 2 by examining the effect of *HCR* on post-merger operating performance. Panel A follows Healy et al. (1992) and uses as the dependent variable the average post-merger industry-adjusted operating performance in years +1 and +2 (or +1, +2, and +3) and controls for operating performance in year –1, where year 0 is the merger announcement year. Operating performance in year –1 is the weighted-average of the acquirer and target industry-adjusted operating performance in year –1, where the weights are based on the merging firms' total assets in year –1. Panel B

[28] In the first step, we follow Bollen and Jackman (1990) and drop influential outliers with a Cook's D greater than 4/N, where N is the number of observations used to estimate the regression. In the second step, an iterative procedure following Li (2006) reduces the weight of observations with large absolute residuals.

follows Hoberg and Phillips (2010) and uses as the dependent variable the change in post-merger industry-adjusted operating performance from year +1 to +2 and from year +1 to +3.[29] Operating performance is measured as the ratio of operating income before depreciation to total net sales.[30] Industry-adjusted operating performance is the difference between a firm's operating performance and the median operating performance for firms in the same three-digit SIC code. All regressions include controls for acquirer and target characteristics (defined in Appendix A) that are measured at time $t-1$. We report t-statistics in parentheses below parameter estimates that are computed using robust standard errors clustered at the year level.

As seen in Table 14, *HCR* has a significantly positive effect on post-merger operating performance as measured using either the Healey et al. (1992) approach (Panel A) or the Hoberg and Phillips (2010) approach (Panel B). Consistent with the generally much lower power associated with measuring operating performance using only post-merger changes in operating cash flows, the coefficient estimates on *HCR* are smaller in Panel B but are generally significant; especially when focusing on the change in operating cash flows from year +1 to +2. In addition, notice that the coefficients on *PMR* are never significantly different from zero and there is not a significant interaction between *HCR* and *PMR*. Overall, consistent with Hypothesis 2, human capital relatedness

[29] Note that the Hoberg and Phillips (2010) approach examines only post-merger changes in operating performance. They argue that this technique biases against finding significant changes due to lost power but avoids having to measure pre-merger operating performance based on a weighted-average of the two firms' operating performance prior to merger. This is especially problematic if there are assets sales at the time of the merger as shown by Maksimovic et al. (2011), because then it may be inappropriate to compare the operating performance of the post-merger firm to a weighted-average of the operating performances of the two firms prior to merger.

[30] Our results are similar if we scale operating income before depreciation by total assets.

has a positive impact on post-merger operating performance which suggests that merging firms can harvest synergies through complementarities in human capital.

2.5 Conclusions

We draw from the property rights theory of the firm and its extension to mergers by Rhodes-Kropf and Robinson (2008) to argue that human capital complementarities may motivate mergers and acquisitions. Developing a measure of the relatedness of firms' human capital, we test the hypotheses that the likelihood of merger and the synergy benefits deriving from merger are increasing in the relatedness of the merging firms' human capital. Consistent with our hypotheses, we find strong evidence that the likelihood of merger is increasing in human capital relatedness and that announcement returns and post-merger operating performance are higher when merging firms have closely related human capital. Consistent with the results in Hoberg and Phillips (2010), we also find that product market relatedness increases both the likelihood and announcement returns of merger. We further document that human capital relatedness and product market relatedness are to some degree substitutes in that the likelihood of merger and the returns from merger are higher if the merging firms have human capital relatedness or product market relatedness but not both.

Table 11 Descriptive statistics and correlations

Panel A. Descriptive Statistics								
Variable	Mean	Std. Dev.	Min.	25th Pctl.	Median	75th Pctl.	Max.	Obs.
Firm relatedness measures								
HCR	0.752	0.283	0.015	0.565	0.854	0.905	1	1,322
PMR	0.503							1,322
Merger returns (%)								
Synergy (-1, +1)	1.477	7.594	-25.09	-2.155	0.933	5.105	25.514	1,322
Synergy (-2, +2)	1.66	8.407	-28.817	-2.586	1.012	5.59	5.59	1,321
Synergy (-3, +3)	1.772	9.325	-29.342	-3.011	1.139	6.372	30.065	1,319
Acquirer CAR (-1, +1)	-1.227	7.649	-20.458	-5.272	-0.823	2.388	30.526	1,322
Acquirer CAR (-2, +2)	-1.182	8.713	-23.619	-5.868	-0.964	2.901	34.38	1,322
Acquirer CAR (-3, +3)	-1.158	9.673	-27.096	-6.348	-0.91	3.274	34.512	1,320
Target CAR (-1, +1)	25.865	26.653	-36.313	8.356	21.009	37.642	129.489	1,322
Target CAR (-2, +2)	27.105	27.45	-31.825	9.321	22.211	39.726	152.761	1,321
Target CAR (-3, +3)	28.057	28.587	-32.698	9.814	22.688	40.193	144.499	1,319
Deal Characteristics								
Relative size_1	0.238	0.357	0	0.025	0.101	0.31	2.307	1,322
Stock deal dummy	0.519							1,322
Acquirer								
Total assets	7.709	2.016	1.741	6.256	7.7	9.287	11.477	1,235
Market-to-book	2.66	2.675	0.711	1.381	1.877	2.826	22.527	1,235
Leverage	0.208	0.183	0	0.053	0.179	0.312	0.94	1,235
Free cash flow	0.023	0.158	-1.678	0.007	0.055	0.092	0.229	1,252
Cash holdings	0.304	0.319	0	0.06	0.193	0.462	1.501	1,260
Sales growth	0.297	0.758	-0.611	0.024	0.124	0.316	8.384	1,247
Prior returns	0.165	0.593	-0.763	-0.154	0.044	0.297	2.909	1,322
Return on assets	0.108	0.137	-1.014	0.077	0.122	0.171	0.345	1,133

Table 11 Continued

Termination fee	0.222							1,322
Target								
Total assets	5.357	1.748	0.632	4.073	5.177	6.54	9.922	1,240
Market-to-book	2.139	1.747	0.522	1.159	1.562	2.385	10.925	1,241
Leverage	0.208	0.235	0	0.003	0.138	0.344	0.956	1,240
Free cash flow	-0.07	0.258	-1.769	-0.096	0.016	0.063	0.247	1,255
Cash holdings	0.418	0.418	0	0.058	0.279	0.698	1.655	1,264
Sales growth	0.314	0.822	-0.778	-0.004	0.114	0.329	5.458	1,249
Prior returns	0.068	0.654	-0.993	-0.329	-0.049	0.281	2.982	1,322
Return on assets	0.023	0.262	-1.669	-0.02	0.098	0.16	0.375	1,255
Termination fee	0.688							1,322

Table 11 Continued

Panel B. Pearson correlation coefficients

	HCR	PMR	Synergy (−1, +1)	Synergy (−2, +2)	Synergy (−3, +3)	Acquire CAR (−1, +1)	Acquire CAR (−2, +2)	Acquire CAR (−3, +3)	Target CAR (−1, +1)	Target CAR (−2, +2)	Target CAR (−3, +3)
HCR	1.000										
PMR	0.243***	1.000									
Synergy (−1, +1)	0.032	0.046*	1.000								
Synergy (−2, +2)	0.024	0.042	0.892***	1.000							
Synergy (−3. +3)	0.024	0.041	0.800***	0.884***	1.000						
Acquirer CAR (−1, +1)	−0.007	−0.003	0.845***	0.752***	0.669***	1.000					
Acquirer CAR (−2, +2)	−0.012	−0.003	0.735***	0.860***	0.744***	0.873***	1.000				
Acquirer CAR (−3, +3)	−0.009	−0.004	0.667***	0.777***	0.871***	0.789***	0.892***	1.000			
Target CAR (−1, +1)	0.016	−0.028	0.280***	0.232***	0.221***	0.122***	0.095***	0.099***	1.000		
Target CAR (−2, +2)	0.023	−0.033	0.265***	0.262***	0.245***	0.119***	0.116***	0.119***	0.959***	1.000	

Table 11 Continued

Target CAR (−3, +3)	0.019	−0.031	0.242***	0.242***	0.286***	0.112***	0.109***	0.149***	0.927***	0.961***	1.000
Relative size_1	0.052*	0.068***	0.165***	0.160***	0.118***	−0.020	−0.029	−0.048*	−0.262***	−0.261***	−0.270***
Stock deal dummy	0.049*	0.072***	−0.190***	−0.154***	−0.134***	−0.242***	−0.201***	−0.177***	−0.226***	−0.214***	−0.215***
Acquirer total assets	−0.042	−0.173***	−0.082***	−0.074***	−0.074***	0.028	0.028	0.022	0.067**	0.069**	0.065**
Acquirer M/B	0.078***	0.031	−0.137***	−0.135***	−0.111***	−0.079***	−0.078***	−0.064**	−0.019	−0.023	−0.017
Acquirer leverage	−0.019	−0.047*	0.094***	0.126***	0.115***	0.061**	0.089***	0.087***	−0.053*	−0.054*	−0.049*
Acquirer free cash flow	−0.049*	−0.011	0.033	0.041	0.077***	0.075***	0.075***	0.101***	0.071***	0.062**	0.071***
Acquirer cash holdings	0.111***	0.110***	−0.106***	−0.124***	−0.108***	−0.105***	−0.117***	−0.107***	0.022	0.023	0.024
Acquirer sales growth	0.052*	0.015	−0.106***	−0.136***	−0.125***	−0.096***	−0.118***	−0.107***	−0.108***	−0.112***	−0.111***
Acquirer prior returns	0.023	0.001	−0.145***	−0.134***	−0.092***	−0.112***	−0.103***	−0.073***	−0.066**	−0.071***	−0.063**
Acquirer ROA	−0.04	−0.064**	0.039	0.068**	0.084**	0.121***	0.121***	0.133***	0.037	0.050*	0.062**
Acquirer term. fee	0.02	0.079***	0.01	0.02	0.019	−0.106***	−0.086***	−0.092***	−0.155***	−0.156***	−0.138***
Target total assets	0.101***	0.070***	0.029	0.03	0.024	−0.084***	−0.084***	−0.079***	−0.137***	−0.143***	−0.148***

Table 11 Continued

Target M/B	0.029	–0.015	–0.152***	–0.159***	–0.138***	–0.112***	–0.117***	–0.108***	–0.110***	–0.114***	–0.108***
Target leverage	0.034	0.044	0.04	0.041	0.053*	0.033	0.025	0.045	–0.071***	–0.059**	–0.058**
Target free cash flow	–0.03	–0.045	0.046	0.032	0.026	–0.023	–0.035	–0.033	–0.063**	–0.096***	–0.101***
Target cash holdings	0.068**	0.026	–0.154***	–0.156***	–0.161***	–0.103***	–0.094***	–0.111***	0.055**	0.059**	0.055**
Target sales growth	0.03	–0.014	–0.057**	–0.043	–0.065**	–0.04	–0.006	–0.024	–0.046*	–0.056**	–0.063**
Target prior returns	–0.005	0.042	–0.047*	–0.047*	–0.046*	–0.024	–0.028	–0.029	–0.063**	–0.065**	–0.067**
Target ROA	–0.016	–0.039	0.061**	0.051*	0.045	–0.007	–0.017	–0.015	–0.091***	–0.119***	–0.122***
Target term. fee	0.028	0.004	0.062**	0.059**	0.058**	0.039	0.039	0.032	–0.02	–0.027	–0.02

Note: The table provides descriptive statistics (Panel A) and Pearson correlation coefficients (Panel B) for the sample of Mergers and Acquisitions announced during the period from 1997 to 2012. All variables are defined in Appendix A. All variables are winsorized at the 1st and 99th percentiles except HCR, PMR, and other dummy variables. We use ***, **, and * to denote significance at the 1%, 5%, and 10% levels, respectively.

Table 12 The effect of human capital relatedness on the probability of merger

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Unadjusted human capital relatedness (HCR)						
HCR	0.474 (29.27)***	0.605 (9.03)***	0.385 (21.66)***	0.601 (8.17)***	0.434 (21.97)***	0.564 (7.36)***
HCR^2		–0.136 (–2.02)**		–0.224 (–2.99)***		–0.139 (–1.76)*
PMR			0.582 (14.33)***	0.596 (14.33)***	0.825 (9.86)***	0.821 (9.63)***
HCR × PMR					–0.432 (–5.93)***	–0.402 (–5.46)***
Total assets of acquirer	0.02 -1.18	0.018 -1.07	0.06 (3.40)***	0.059 (3.26)***	0.062 (3.34)***	0.061 (3.27)***
Total assets of target	–0.024 (–1.36)	–0.023 (–1.30)	–0.055 (–2.93)***	–0.055 (–2.91 ***	–0.055 (–2.87)***	–0.056 (–2.86)***
Market-to-book of acquirer	0.089 (4.65)***	0.089 (4.65)***	0.095 (4.69)***	0.098 (4.77)***	0.101 (4.80)***	0.102 (4.84)***
Market-to-book of target	0.007 -0.44	0.004 -0.25	0.002 -0.12	–0.002 (–0.12)	–0.003 (–0.17)	–0.005 (–0.29)
Leverage of acquirer	–0.055 (–3.39)***	–0.054 (–3.31)***	–0.046 (–2.59)***	–0.045 (–2.51)**	–0.042 (–2.30)**	–0.042 (–2.27)**
Leverage of target	–0.01 (–0.59)	–0.009 (–0.56)	–0.018 (–0.99)	–0.019 (–1.01)	–0.014 (–0.77)	–0.015 (–0.79)
Free cash flow of acquirer	0.08 (3.16)***	0.078 (3.08)***	0.104 (3.54)***	0.102 (3.44)***	0.097 (3.30)***	0.096 (3.23)***
Free cash flow of target	0.034 -0.85	0.032 -0.8	0.048 -1.07	0.046 -1.02	0.04 -0.87	0.04 -0.85
Cash holdings of acquirer	–0.032 (–1.68)*	–0.03 (–1.58)	–0.05 (–2.38)**	–0.048 (–2.27)**	–0.048 (–2.24)**	–0.047 (–2.19)**
Cash holdings of target	–0.032 (–1.71)*	–0.029 (–1.51)	–0.032 (–1.60)	–0.028 (–1.37)	–0.031 (–1.47)	–0.028 (–1.33)

Table 12 Continued

Sales growth of acquirer	0.013 -0.88	0.012 -0.85	0 (–0.02)	–0.001 (–0.06)	–0.001 (–0.06)	–0.001 (–0.08)
Sales growth of target	–0.006 (–0.40)	–0.005 (–0.34)	0.007 -0.44	0.008 -0.52	0.008 -0.48	0.008 -0.52
Return on assets of acquirer	–0.044 (–1.70)*	–0.041 (–1.56)	–0.056 (–1.86)*	–0.053 (–1.75)*	–0.047 (–1.57)	–0.045 (–1.50)
Return on assets of target	–0.061 (–1.45)	–0.058 (–1.38)	–0.06 (–1.31)	–0.058 (–1.24)	–0.057 (–1.21)	–0.056 (–1.17)
Model chi-square	928.21***	943.46***	737.86***	746.96***	904.00***	894.90***
Pseudo R^2	0.46	0.46	0.57	0.57	0.58	0.58
Observed prob. of merger	0.5	0.5	0.5	0.5	0.5	0.5
Predicted prob. of merger	0.52	0.51	0.6	0.58	0.55	0.55
No. of observations	2,246	2,246	2,246	2,246	2,246	2,246
Panel B. Adjusted human capital relatedness (HCR_ε)						
HCR_ε	0.236 (19.24)***	0.229 (17.94)***	0.319 (21.66)***	0.297 (17.50)***	0.359 (21.97)***	0.39 (16.34)***
$(HCR\_\varepsilon)^2$		0.068 (5.28)***		0.046 (2.83)***		–0.039 (–1.76)*
PMR			0.744 (21.90)***	0.74 (21.12)***	0.741 (21.29)***	0.744 (21.17)***
HCR_ε × PMR					–0.149 (–5.93)***	–0.182 (–5.83)***
Total assets of acquirer	–0.01 (–0.68)	–0.01 (–0.69)	0.06 (3.40)***	0.062 (3.49)***	0.062 (3.34)***	0.061 (3.27)***
Total assets of target	0.028 (1.85)*	0.03 (2.01)**	–0.055 (–2.93)***	–0.055 (–2.92)***	–0.055 (–2.87)***	–0.056 (–2.86)***
Market-to-book of acquirer	0.087 (5.47)***	0.089 (5.54)***	0.095 (4.69)***	0.096 (4.70)***	0.101 (4.80)***	0.102 (4.84)***
Market-to-book of target	0.01 -0.7	0.01 -0.68	0.002 -0.12	0.004 -0.22	–0.003 (–0.17)	–0.005 (–0.29)

Table 12 Continued

Leverage of acquirer	–0.068 (–4.99)***	–0.065 (–4.74)***	–0.046 (–2.59)***	–0.046 (–2.56)**	–0.042 (–2.30)**	–0.042 (–2.27)**
Leverage of target	–0.002 (–0.16)	0.001 -0.04	–0.018 (–0.99)	–0.017 (–0.90)	–0.014 (–0.77)	–0.015 (–0.79)
Free cash flow of acquirer	0.071 (3.45)***	0.069 (3.35)***	0.104 (3.54)***	0.103 (3.53)***	0.097 (3.30)***	0.096 (3.23)***
Free cash flow of target	0.022 -0.65	0.019 -0.56	0.048 -1.07	0.047 -1.04	0.04 -0.87	0.04 -0.85
Cash holdings of acquirer	0.004 -0.26	0.004 -0.25	–0.05 (–2.38)**	–0.051 (–2.41)**	–0.048 (–2.24)**	–0.047 (–2.19)**
Cash holdings of target	–0.015 (–0.97)	–0.015 (–0.92)	–0.032 (–1.60)	–0.035 (–1.74)*	–0.031 (–1.47)	–0.028 (–1.33)
Sales growth of acquirer	0.024 (1.94)*	0.024 (1.96)**	0 (–0.02)	0 0	–0.001 (–0.06)	–0.001 (–0.08)
Sales growth of target	–0.013 (–1.06)	–0.013 (–1.04)	0.007 -0.44	0.006 -0.38	0.008 -0.48	0.008 -0.52
Return on assets of acquirer	–0.032 (–1.49)	–0.03 (–1.40)	–0.056 (–1.86)*	–0.056 (–1.86)*	–0.047 (–1.57)	–0.045 (–1.50)
Return on assets of target	–0.058 (–1.64)	–0.057 (–1.61)	–0.06 (–1.31)	–0.062 (–1.34)	–0.057 (–1.21)	–0.056 (–1.17)
Model chi-square	499.92***	485.41***	737.86***	801.70***	904.00***	894.90***
Pseudo R^2	0.21	0.21	0.56	0.57	0.58	0.58
Observed prob. of merger	0.5	0.5	0.5	0.5	0.5	0.5
Predicted prob. of merger	0.51	0.51	0.6	0.59	0.55	0.55
No. of observations	2,246	2,246	2,246	2,246	2,246	2,246

Note: The table reports marginal effects from probit regressions of the probability of merger. Marginal effects are computed for a one-standard-deviation change for continuous variables and for a change from zero to one for dummy variables. The sample includes merging firm pairs (acquirer and target) announced during the period from 1997 to 2012 and a sample of non-merging control firm pairs. Each merging firm pair has one matching non-merging firm pair. The matching pair of firms is selected based on the number of segments, total assets, and market-to-book (M/B) ratio. For each acquirer (target) in year *t*, we identify five firms from

Table 12 Continued

the Compustat segment database in year *t* that have the closest number of segments and do not engage in M&A activity in years *t* and *t*−1. Among the five firms, we identify the three firms that have the closest total assets. Lastly, of these three firms, we select the firm with the closest M/B ratio. Doing this procedure for each acquirer and target in a merger pair, we generate a matching sample of non-merging firm pairs. Panel A uses the human capital relatedness measure (HCR) not orthogonalized against the product market relatedness (PMR) measure. Panel B uses the orthogonalization of HCR against PMR. In particular, using both merging and non-merging pairs, we use the residual from a regression of HCR against PMR (i.e., HCR_ε). The predicted probability is computed at the sample means of the explanatory variables. All explanatory variables are defined in Appendix A. We report *z*-values which test whether the underlying probit coefficients estimates are equal to zero in parentheses below the marginal effects. The z-values are computed using robust standard errors clustered at the year level. We use ***, **, and * to denote significance at the 1%, 5%, and 10% levels, respectively.

Table 13 The effect of human capital relatedness on the gains from merger

	Synergy (−1, +1) (1)	Acquirer (−1, +1) (2)	Target (−1, +1) (3)	Synergy (−1, +1) (4)	PMR = 0 Synergy (−1, +1) (5)	PMR = 1 Synergy (−1, +1) (6)	Orthogonal HCR Synergy (−1, +1) (7)	Robust Regression Synergy (−1, +1) (8)
HCR	1.079	0.815	3.022	1.989	2.243	0.086	1.989	1.257
	(2.47)**	(1.26)	(1.06)	(3.43)***	(3.70)***	(0.09)	(3.43)***	(3.08)***
PMR				2.455			0.747	1.686
				(1.86)*			(1.65)*	(2.62)***
HCR × PMR				−2.414			−2.414	−1.627
				(−1.97)**			(−1.87)*	(−2.46)**
Relative size_1	3.237	1.06	−12.71	3.292	5.757	1.554	3.292	2.808
	(3.43)***	(1.39)	(−5.51)***	(3.50)***	(2.39)**	(2.02)**	(3.50)***	(6.98)***
Stock deal dummy	−2.804	−2.522	−6.281	−2.85	−2.633	−3.155	−2.85	−2.97
	(−4.68)***	(−3.85)***	(−3.66)***	(−4.91)***	(−5.37)***	(−3.89)***	(−4.91)***	(−13.40)***
Total assets of acquirer	−0.646	0.059	0.476	−0.59	−0.424	−0.695	−0.59	−0.603
	(−2.30)**	(0.24)	(0.65)	(−1.99)**	(−1.28)	(−2.05)**	(−1.99)**	(−5.92)***
Total assets of target	0.18	−0.591	−1.824	0.146	0.096	0.138	0.146	0.429
	(0.82)	(−2.57)**	(−2.05)**	(0.64)	(0.4)	(0.47)	(0.64)	(4.54)***

Table 13 Continued

Market-to-book of acquirer	0.161	0.245	0.618	0.165	0.356	0.051	0.165	0.089
	(1.00)	(1.56)	(1.04)	(1.02)	(1.69)*	(0.17)	(1.02)	(0.81)
Market-to-book of target	–0.365	–0.487	–1.761	–0.381	–0.44	–0.187	–0.381	–0.051
	(–3.40)***	(–3.51)***	(–3.54)***	(–3.56)***	(–3.73)***	(–0.75)	(–3.56)***	(–1.08)
Leverage of acquirer	3.191	2.604	1.586	3.273	5.474	1.508	3.273	3.241
	(2.01)**	(1.46)	(0.39)	(2.05)**	(2.35)**	(0.97)	(2.05)**	(4.48)***
Leverage of target	–1.931	–0.207	–1.699	–1.948	–1.538	–2.577	–1.948	–1.616
	(–2.00)**	(–0.16)	(–0.28)	(–2.07)**	(–0.76)	(–2.21)**	(–2.07)**	(–3.48)***
Free cash flow of acquirer	0.286	0.057	11.919	0.322	3.202	–1.744	0.322	–0.084
	(0.19)	(0.03)	(3.10)***	(0.21)	(1.91)*	(–0.67)	(0.21)	(–0.08)
Free cash flow of target	–1.328	–1.907	0.054	–1.23	–0.376	–1.526	–1.23	–0.911
	(–1.17)	(–1.51)	(0.01)	(–1.08)	(–0.29)	(–0.84)	(–1.08)	(–2.06)**
Cash holdings of acquirer	–1.647	–0.945	0.088	–1.626	–1.406	–2.109	–1.626	–1.776
	(–1.63)	(–0.74)	(0.02)	(–1.56)	(–0.92)	(–1.29)	(–1.56)	(–4.08)***
Cash holdings of target	–1.924	–2.25	–0.171	–1.9	–0.797	–2.828	–1.9	–1.003
	(–2.46)**	(–2.77)***	(–0.06)	(–2.42)**	(–0.81)	(–3.17)***	(–2.42)**	(–2.54)**
Sales growth of acquirer	–0.654	–0.676	–2.105	–0.655	–0.666	–0.78	–0.655	–0.666
	(–1.17)	(–1.49)	(–3.05)***	(–1.18)	(–0.77)	(–1.24)	(–1.18)	(–3.81)***

Table 13 Continued

Sales growth of target	0.248	0.459	–0.741	0.266	–0.217	0.62	0.266	0.215
	(0.65)	(1.09)	(–0.80)	(0.7)	(–0.72)	(0.81)	(0.7)	(2.43)**
Prior returns of acquirer	–1.111	–0.598	0.121	–1.055	–0.208	–1.608	–1.055	–0.54
	(–2.02)**	(–1.20)	(0.08)	(–1.96)**	(–0.36)	(–2.03)**	(–1.96)**	(–2.89)***
Prior returns of target	–0.082	0.097	–6.416	–0.114	–0.634	0.08	–0.114	–0.555
	(–0.26)	(0.30)	(–4.77)***	(–0.36)	(–0.91)	(0.13)	(–0.36)	(–3.13)***
Termination fee acquirer	–1.22	–1.652	–1.244	–1.285	–2.806	0.068	–1.285	–1.441
	(–2.32)**	(–2.85)***	(–0.72)	(–2.35)**	(–3.46)***	(0.12)	(–2.35)**	(–4.64)***
Termination fee target	0.443	0.051	1.047	0.497	1.439	–0.453	0.497	0.192
	(0.79)	(0.08)	(0.61)	(0.86)	(2.46)**	(–0.53)	(0.86)	(0.66)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.158	0.144	0.161	0.162	0.233	0.166	0.162	0.378
No. of observations	1,127	1,127	1,127	1,127	493	634	1,127	893

Note: The table examines the effect of human capital relatedness (HCR) on merger announcement returns using ordinary least squares regressions. The sample includes merger and acquisition deals announced during the period 1997-2012. The dependent variable Synergy (−1, +1) in models (1) and (4)-(8) is the weighted average of the cumulative abnormal returns of acquirer and target over days −1, 0, and +1, where day 0 is the merger announcement day. The weights are based on the market values of the equity of the acquirer and target four days prior to the merger announcement day. The dependent variables

Table 13 Continued

Acquirer (−1, +1) and Target (−1, +1) in models (2) and (3) are the cumulative abnormal returns of acquirer and target over the same event window. All variables are defined in Appendix A and all variables are winsorized at the 1st and 99th percentiles except HCR, PMR, and other dummy variables. Model (7) uses the residual from a regression of HCR on PMR for the human capital relatedness measure. Model (8) is a robust regression that uses a two-step procedure to reduce the impact of outliers in the OLS regression. In the first step, we follow Bollen and Jackman (1990) and drop influential outliers with a Cook's D greater than 4/N, where N is the number of observations used to estimate the regression. In the second step, an iterative procedure following Li (2006) reduces the weight of observations with large absolute residuals. We report t-statistics in parentheses below parameter estimates that are computed using robust standard errors clusters at the year level. We use ***, **, and * to denote significance at the 1%, 5%, and 10% levels, respectively.

Table 14 The effect of human capital relatedness on post-merger operating performance

Panel A. Dependent variable is average post-merger industry-adjusted operating performance

	Average of years +1 and +2			Average of years +1, +2, and +3		
Variable	(1)	(2)	(3)	(4)	(5)	(6)
HCR	0.074	0.076	0.068	0.082	0.082	0.078
	(3.29)***	(3.07)***	(1.70)*	(3.74)***	(3.30)***	(1.87)*
PMR		−0.006	−0.019		0.000	−0.006
		(−0.43)	(−0.79)		(−0.01)	(−0.20)
HCR × PMR			0.017			0.007
			(0.45)			(0.17)
Operating performance in year -1	0.339	0.339	0.339	0.296	0.296	0.296
	(5.79)***	(5.82)***	(5.82)***	(5.29)***	(5.32)***	(5.32)***
Relative size_1	0.010	0.010	0.010	0.014	0.014	0.014
	(0.59)	(0.59)	(0.57)	(0.85)	(0.85)	(0.84)
Total assets of acquirer	0.017	0.017	0.017	0.021	0.021	0.021
	(3.48)***	(3.28)***	(3.34)***	(3.27)***	(3.14)***	(3.21)***
Total assets of target	−0.014	−0.013	−0.013	−0.014	−0.014	−0.014
	(−2.63)	(−2.72)	(−2.73)	(−2.59)	(−2.70)	(−2.72)

Table 14 Continued

Market-to-book of acquirer	0.007	0.007	0.007	0.008	0.008	0.008
	(0.73)	(0.73)	(0.72)	(0.82)	(0.82)	(0.82)
Market-to-book of target	0.009	0.009	0.009	0.005	0.005	0.005
	(1.68)	(1.68)	(1.7)	(0.97)	(0.97)	(0.98)
Leverage of acquirer	0.056	0.056	0.056	0.057	0.057	0.57
	(0.79)	(0.8)	(0.78)	(0.76)	(0.76)	(0.76)
Leverage of target	−0.016	−0.015	−0.015	−0.013	−0.013	−0.013
	(−0.47)	(−0.42)	(−0.44)	(−0.38)	(−0.37)	(−0.38)
Cash holdings of acquirer	−0.008	−0.007	−0.007	0.004	0.004	0.004
	(−0.21)	(−0.17)	(−0.19)	(0.09)	(0.09)	(0.09)
Cash holding of target	0.081	0.082	0.082	0.083	0.083	0.083
	(4.44)***	(4.53)***	(4.55)***	(4.16)***	(4.23)***	(4.25)***
Adjusted R^2	0.544	0.544	0.545	0.494	0.494	0.494
No. of observations	949	949	949	863	863	863

Table 14 Continued

Panel B. Dependent variable is change in post-merger industry-adjusted operating performance

	From year +1 to +2			From year +1 to +3		
Variable	(1)	(2)	(3)	(4)	(5)	(6)
HCR	0.018	0.02	0.028	0.005	0.006	0.019
	(1.77)*	(1.68)*	(2.16)**	-0.6	-0.61	(1.86)*
PMR		–0.004	0.009		–0.002	0.018
		(-0.44)	-0.54		(-0.22)	-0.62
HCR × PMR			–0.017			–0.026
			(-0.83)			(-0.93)
Relative size_1	0.015	0.015	0.015	0.031	0.031	0.32
	(0.86)	(0.86)	(0.89)	(1.87)*	(1.88)*	(1.94)*
Total assets of acquirer	–0.003	–0.003	–0.003	0.000	0.000	0.000
	(-0.79)	(-0.84)	(-0.82)	(0.08)	(0.05)	(0.08)
Total assets of target	0.001	0.001	0.001	–0.002	–0.002	–0.002
	(0.24)	(0.31)	(0.29)	(-0.43)	(-0.41)	(-0.45)
Market-to-book of acquirer	–0.01	–0.01	–0.01	–0.006	–0.006	–0.006
	(-7.88)***	(-7.88)***	(-7.69)***	(-3.15)***	(-3.12)***	(-2.95)***
Market-to-book of target	–0.001	–0.001	–0.001	–0.005	–0.005	–0.005

Table 14 Continued

	(-0.41)	(-0.41)	(-0.43)	(-1.47)	(-1.45)	(-1.45)
Leverage of acquirer	0.004	0.004	0.004	0.028	0.028	0.029
	(0.10)	(0.10)	(0.11)	(1.01)	(1.00)	(1.02)
Leverage of target	–0.006	–0.005	–0.004	0.039	0.039	0.04
	(-0.27)	(-0.23)	(-0.20)	(1.56)	(1.60)	(1.60)
Cash holdings of acquirer	0.022	0.022	0.023	0.082	0.083	0.083
	-0.56	-0.58	-0.59	(2.21)**	(2.24)**	(2.25)**
Cash holding of target	0.012	0.012	0.012	0.019	0.019	0.2
	(0.68)	(0.70)	(0.70)	(0.67)	(0.68)	(0.68)
Adjusted R^2	0.041	0.041	0.041	0.044	0.044	0.044
No. of observations	964	964	964	878	878	878

Note: The table examines the effect of human capital relatedness (HCR) on post-merger operating performance using ordinary least squares regressions. The sample includes merger and acquisition deals announced during the period 1997-2012. Panel A follows Healy, Palepu, and Ruback (1992) and uses as the dependent variable the average post-merger industry-adjusted operating performance in years +1 and +2 (or +1, +2, and +3) and controls for operating performance in year −1, where year 0 is the merger announcement year. Operating performance in year −1 is the weighted-average of the acquirer and target industry-adjusted operating performance in year −1, where the weights are based on the merging firms' total assets in year −1. Panel B follows Hoberg and Phillips (2010) and uses as the dependent variable the change in post-merger industry-adjusted operating performance from year +1 to +2 and from year +1 to +3. Operating performance is measured as the ratio of operating income before depreciation to total net sales. Industry-adjusted operating performance is the difference between a firm's operating performance and the median operating performance for firms in the same three-digit SIC code. All variables are defined in Appendix A and all variables are winsorized at the 1st and 99th percentiles except HCR and PMR. We report t-statistics in parentheses below parameter estimates that are computed using robust standard errors clusters at the year level. We use ***, **, and * to denote significance at the 1%, 5%, and 10% levels, respectively.

CHAPTER 3

REPETITIVE CROSS-BORDER MERGERS AND ACQUISITIONS

3.1 Introduction

A significant fraction of mergers and acquisitions (M&A) activity is conducted by repeat acquirers. Ahern (2008) finds that only 38% of M&A deals are made by first-time acquirers. Existing research on repeat acquirers finds that returns to acquisition announcements by repeat acquirers declines with successive deals (see, e.g., Fuller et al. (2002), Conn et al. (2004), Croci (2005), Ahern (2008), Ismail (2008), Aktas et al. (2009), and Billet and Qian (2008)). Many of these studies attribute the declining returns over the deal sequence to growing hubris. In contrast, the management literature argues that with repeat acquisitions, firms gain experience on how to select the right acquisitions (see, e.g., Hayward (2002), Barkema and Schijven (2008) and Harding and Rovit (2004)).

Large-sample empirical research on repeat acquirers and their ability to learn from acquisition is scarce. Aktas et al. ((2011), (2013)) look at the bidding behavior of repeat acquirers, their CARs and the time between successive deals and conclude that, over time, acquirers learn to value targets more accurately. Their results provide an alternative to the prevalent hubris argument and open up avenues for further research on learning in acquisitions. For example, the nascent empirical literature on learning does not account for the complex nature of acquisitions. Acquisitions involve several interdependent but distinct subactivities - due diligence, negotiations during the bidding process, merger financing, and, critically, post-merger integration. As pointed out by Barkema and Schijven (2008), no two deals are the same. Sometimes the only common element between two successive acquisitions is the acquirer itself. This heterogeneity can make it

difficult for the acquiring firm's management to detect a causal relation between an action taken and the performance outcomes obtained. In the absence of common features between successive acquisitions, learning can be difficult. It is not surprising then that in the literature some studies find evidence of learning and others do not.

In this paper, we examine whether serial acquirers learn from past acquisitions by focusing on successive acquisitions that have a common recurring feature. Specifically, we focus on repeat cross-border acquisitions where the targeted country is the same. Cross-border acquisitions provide many challenges and opportunities for learning. Cross-border acquisitions encounter national cultural barriers, institutional differences, differences in governance, and corporate culture as well as political uncertainty and red tape (see, e.g., Rossi and Volpin (2004), Dinc and Erel (2013), Lee (2013), and Ahern et al. (2014)). Repeat acquisitions in the same country allow acquirers to become familiar with a country's political and institutional framework and corporate culture, possibly improving their ability to surmount these challenges.

Using a sample of 53,940 cross-border acquisitions announced between the years 1990 and 2010, we examine whether acquirers learn from repeat acquisitions in the same country. Summary statistics indicate that as an acquirer makes more acquisitions in the same country, the time between successive deals declines, the percentage of ownership stake acquired increases, and the percentage of consideration paid in cash increases. These patterns could be indicative of improved knowledge of and commitment to conducting business in the target country, but may also be indicative of growing hubris. To determine whether learning occurs, we use the arguments of Hayward (2002) and Aktas et al. (2013) regarding the time between deals (TBD). Acquirers are expected to be

able to learn effectively if the time between deals is long enough for management to observe, assess, and recognize the link between actions taken and results observed, but not so long that their memory fades and learning dissipates. We find that for the low-TBD sample, which Hayward refers to as the experience-building situation, TBD is a decreasing function of the deal order number, the number of deals made by an acquirer. Thus, when acquirers are learning from acquisitions, they increase the frequency of their acquisitions. In the high-TBD sample, the memory-loss situation, there is no significant link between the TBD and the deal order number. These findings appear to be supportive of the learning hypothesis. To test whether the acquirer's learning is specific to the country in which the successive deals occur, we conduct a similar test in which we do not condition on the target country. We look at all successive cross-border deals undertaken by an acquirer and divide these deals into experience-building and memory-loss subsamples. In this test, we do not find a decline in the TBD in the experience-building subsample. Our finding that the TBD declines with the deal order number in the same country, but not across all countries suggests that learning is specific to the country in which repeat deals occur.

We also look at the acquirer announcement returns for successive deals in the same target country. We find that announcement returns of the acquirer decline with successive deals in the same country. This pattern of declining CARs may seem inconsistent with learning, but it is not. As argued by previous papers, if targets are being valued more precisely, more of the value may be passed on to the targets in the bidding process, thus leading to lower acquirer returns. Again, to test for learning, we divide the sample into experience-building (low-TBD) and memory-loss (high-TBD) subsamples.

In the low-TBD sample, acquirer CARs increase with the TBD, indicating that learning occurs during the experience-building situation. In the high-TBD sample, acquirer CARs are not related to the TBD.

Our paper contributes to the growing literature on learning in mergers and acquisitions. Previous papers on learning do not identify common features across successive acquisitions that can facilitate learning. We focus on cross-border acquisitions and examine whether acquirers learn from making successive acquisitions in the same country. Our results are broadly supportive of learning in M&As.

Our paper also contributes to the cross-border acquisition literature. Prior studies in the literature primarily focus on frictions in the cross-border M&A market (e.g., differences in culture and institutional quality) and time-varying macroeconomic conditions (e.g., economic development and currency appreciation/depreciation) to explain how firms choose a target country to make a deal. The literature, however, has been silent about the fact that many firms repeat deals in the same target country, despite the aforementioned challenges and changing economic conditions, which make it more attractive to switch to another country. We provide an explanation: firms gain by learning through repetitive deals in the same country.

Lastly, our study advances our understanding of the means of payment to finance cross-border transactions. We show that a bidder's financing choices depends on its prior deal experience in the country.

The rest of the paper is organized as follows. Section 2 presents the data and variable construction. Section 3 discusses the results and Section 4 concludes.

3.2 Data

Our sample begins with all cross-border mergers and acquisitions among 48 countries reported by Thompson's Securities Data Corporation (SDC), announced during 1990 and 2010, and completed by the end of 2013. To be considered as a cross-border transaction, we require that neither the acquirer firm nor its ultimate parent be domiciled in the same country as the target firm, in which the information on the country of domicile is from SDC. We exclude deals in which the acquirer or the target is a government agency. We further exclude leverage buyouts, spin-offs, recapitalizations, self-tender offers, exchange offers, repurchases, minority stake purchases, acquisitions of minority interest, and privatizations. We also require that the acquirer and the target not be from a financial or utilities industry. The final sample consists of 53,940 cross-border mergers and acquisitions. A cross-country matrix is formed in Table 15, showing the number of cross-border deals, as well as domestic deals, undertaken by firms in a certain country.

We obtain further information on deal characteristics from SDC, including transaction value in U.S. dollars, bid premium, the percentage purchased by the acquirer, and payment method. In addition, SDC provides information on the acquirer and target companies, such as the name, ultimate parent, and industry classification (2-digit SIC code).

Our analysis controls for several country-level variables known to influence cross-border M&As. We collect annual GDP (in U.S. dollars) and annual GDP per capita (in U.S. dollars) from the World Development Indicator from the World Bank. Country-

level stock market return data in U.S. dollars are from Datastream. Real exchange rate returns in U.S. dollars are obtained from Penn World Table.

Later, we examine the acquirer and the target's stock returns around the announcement date. To perform such an examination, we obtain stock returns data from the Center for Research in Security Prices (CRSP) for U.S. companies, and from Datastream for non-U.S. companies. We collect accounting information from the Compustat database for U.S. firms and from Datastream for non-U.S. firms.

Table 16 presents summary statistics of the key variables of the paper. The average time between deals is 778 days. The mean percentage of target shares acquired is 93%, and the average percentage cash payment is 69.6%. The high percentage of cash payment is also found in previous cross-border merger papers. For example, Moeller and Schlingemann (2005) document that, on average, 78% of consideration is paid in cash in their cross-border merger sample. Starks and Wei (2013) document an average cash payment of 72%.

All variables are described in the appendix A. Table 17 presents correlations between the main variables used in our analysis.

3.3 Results

3.3.1 Main results

We begin by examining how the time between deals (TBD), percentage of shares acquired, and percentage paid in cash change with the deal order number. Table 18 Panel A and Figure 1 show that the time between deals declines with progressive acquisitions in the same country. The mean TBD is 835 days for the first five acquisitions in a country. The mean TBD is 385 days for the 6th through 10th acquisitions in the same country and

continues to fall with successive deals in the same country. Although the number of observations is small for deal order numbers greater than 16, we see that the mean TBD falls to 263 days in this category. Table 18 also shows that the percentage stake acquired rises from 93% for the first five deals to 100% for deal order numbers greater than 16. Similarly, the percentage paid in cash increases from 69% to 80%.

Since the deal order number increases with the passage of time, it is possible that these patterns reflect time trends and are not characteristic of repeat acquisitions in the same country. In Panel B of Table 18, we present the following regression framework that controls for the time trend (Trend), year fixed-effects (τ), and country fixed-effects (δ and θ):

$$y_{i,j,n,t} = \alpha_{i,j,n,t} + \beta * DONC_{i,j,n,t} + \gamma * \boldsymbol{X}_{i,j,t} + Trend_t + \delta_i + \theta_j + \tau_t + \varepsilon_{i,j,n,t} \quad (3.1)$$

In equation (1), *i* represents the acquirer country, *j* represents the target country, and *t* represents the announcement year of a given deal n. We regress the TBD, percentage acquired, and percentage paid in cash on the deal order number in the same country (DONC), which is the variable of our primary interest. Since economic conditions can affect how quickly an acquirer returns to the same country, we control for macro-economic/financial variables (X), such as GDP per capita, GDP growth, stock market returns, and currency exchange rates. Our findings hold in the multivariate analysis. The coefficient on the deal order number is negative for the TBD and positive for the percentage acquired and the percentage paid in cash.

So far we have assumed that the relation between the dependent variable and the DONC is linear. In Panel C, we relax this assumption by re-estimating the regression models in Panel B with the squared term, DONC . The coefficient on DONC is

significant across all dependent variables, which suggests non-linear relations. More importantly, we continue to find that the DONC is significantly and negatively associated with the TBD, and is positively associated with the percentage stake acquired and the percentage of cash payment.

3.3.2. TBD in experience building versus memory loss periods

One possible explanation for these patterns is that repeat acquisitions in the same country help an acquirer value business opportunities in that country more accurately and enable the acquirer to navigate the legal and political environment more quickly. The greater precision with which firms can be valued can encourage the acquirer to commit to 100% ownership and a higher cash payment. However, these patterns could also be consistent with growing managerial overconfidence. To distinguish between the two, we use the arguments proposed by Hayward (2002). Learning is expected to be a concave function of the TBD. When the TBD is very small, there is very little time between deals for effective learning. As the TBD rises, the amount of learning occurring between deals also increases, but only up to a point. After a threshold value of the TBD is crossed, memory loss kicks in. When deals are too far apart, acquisition expertise wanes. Aktas et al. (2013) argue that below a threshold value of the TBD (experience-building situation), a declining TBD through successive acquisition is indicative of learning, while above the threshold value (memory-loss situation), an increase in TBD is indicative of learning. Following Aktas et al. (2013), we calculate the abnormal TBD as the TBD less the median TBD in the acquirer's industry, the same acquirer country and the same target country. Then we examine the link between the abnormal TBD and the deal order number in the same country (DONC) for two subsamples – those with the TBD in the bottom

quartile and those with the TBD in the top quartile. Columns 1 and 2 in Table 19 present the results. Consistent with Aktas et al. (2013), we find a negative and significant relation between the TBD and the DONC in the low-TBD subsample. The relation between the TBD and the DONC in the high-TBD sample is positive but statistically insignificant.

While our results thus far support country-specific learning, it is possible that our results are driven by the acquirer's learning from deal experience in other countries rather than learning through repeat deals in the same country. This is because, by construction, our DONC measure (i.e., deal experience in a given country) is positively correlated with the acquirer's acquisition experience in all countries. To examine whether the acquirer's learning is country-specific, we re-estimate the models with the deal order number not conditioning on the target country (DON). Columns 3 and 4 in Table 19 present the results. We do not find any significant association between the DON and the TBD, neither in the experience-building nor the memory-loss periods. The results here lend further support to country-specific learning through repetitive acquisitions.

3.3.3 Acquirer abnormal announcement returns (CARs)

Next, we examine cumulative abnormal returns (CARs) of the acquiring firm to obtain a better understanding of an acquirer's experience with repeat acquisitions in the same country. We calculate CARs for acquirers using three different event windows surrounding a merger announcement: (-1, +1), (-2, +2), and (-3, +3). CARs are calculated as market model adjusted stock returns around the acquisition announcement date. To estimate abnormal returns, we use a two-factor market model with the equity market index for each country and the MSCI world index (Griffin, 2002). For each deal, we

estimate the following market model during the period (d-280, d-30), in which day d is the announcement day:

$$r_{i,t} = \alpha_i + \beta_{i,1} r_{acquirer\ country,t} + \beta_{i,1} r_{world,t} + \varepsilon_t \quad (2)$$

The cumulative abnormal returns (CARs) are estimated by summing up the abnormal return for each day over different event windows.

Table 20 provides summary statistics for acquirer CARs across different event windows. Panel A reports that acquirers, on average, have positive CARs of 1%. Panel B reports CARs for the first deal in the country (DONC = 1). The average CAR is approximately 1.2%. Panel C reports CARs for repeat deals in the country (DONC > 1). The average CAR is about 8%, lower than the first deal.

In Table 21, we present multivariate regressions of acquirer CARs on the deal order number in the country (DONC). The coefficient on the DONC is negative, indicating that acquirer CARs decline with successive acquisitions in the same country. We investigate when the underperformance begins by creating four dummy variables to capture the first five deals, deals 6 through 10, deals 11 through 15, and so on. The first three dummy variables are included in the regression, while the last one is subsumed by the intercept. [31]

Column 4 in Table 21 shows that acquirer CARs are persistently negative for all the dummy variables. As pointed out by previous literature, this is not proof that learning is not occurring. If acquirers are learning to value targets more precisely, a larger fraction of the gains from learning may accrue to targets, leaving less for acquiring shareholders. To test whether learning is occurring, we turn again to Aktas et al.'s method of dividing

[31] We estimate the regression without an intercept and find that the coefficient on the last dummy (16th deal or more) is almost identical to the third dummy (11th – 15th deals).

the sample into experience-building and memory-loss situations. In the experience-building subsample (low-TBD), acquirers are learning from making more acquisitions, so there should be a positive link between acquirer CARs and DONC. In the memory-loss situation (high-TBD), too much time elapses between successive deals and any experience gained from a merger is reset. With each merger, the acquirer is effectively beginning from scratch. Therefore, there is no predictable link between the CAR and the DONC when the TBD is high. In Table 22 Panel A, we divide the subsample into deals with the TBD in the bottom quartile and the TBD in the top quartile. We find that the link between acquirer CARs and DONC is positive in the low-TBD subsample, but insignificant in the high-TBD sample. This result is consistent with the hypothesis that learning is occurring due to successive deals in the same country, provided that the TBD is not too high.

To ensure that our results support country-specific learning, we re-estimate the regression with the acquirer's cross-border deal experience, not conditioning on the target country (DON). Panel B presents the estimation results. We do not find any significant association between the DON and CAR in either of the subsamples. The results suggest that the acquirers' merger gain is limited to country specific learning.

3.4 Conclusion

In this study, we show that a significant portion of cross-border merger deals is undertaken by firms repeating deals in the same target country. Given that cross-border acquisitions involve many challenges compared to domestic deals, we examine whether those serial acquirers learn from prior deal experience in the country.

Using a large sample of cross-border M&A deals, we find that as the acquirer repeats deals in the same target country, time between successive deals declines, the percentage of ownership acquired increases, and the percentage of consideration paid in cash increases. To distinguish whether the results are driven by learning or growing hubris, we look at two different stages of learning (Hayward, 2002): experience building and memory loss. We find a negative association between the time between deals and the number of deals the acquirer has made in the same country only during the experience-building periods. We also find that as the acquirer makes more deals in the country, the acquirer announcement returns are higher during the experience-building periods. We do not find such patterns in the memory-loss periods. Furthermore, we do not find such results when we use the acquirers' prior cross-border deal experience in other countries, which suggests that learning is country-specific.

Overall, our evidence suggests that by repeating acquisitions in the same country, the acquirer learns more about the country's economic and political environment. Such learning-by-doing leads to value creation, depending on the timing of learning.

Table 15 Number of mergers and acquisitions by country pair

Nation	AR	AS	AU	BL	BR	CA	CC	CE	CH	CO	CT	CY	DN	FN	FR	GR	HK	HU	ID	IN	IR	IS	IT	JP	LX	MA	MX	NO	NT	NZ	PE	PH	PL	PO	RU	SA	SG	SK	SP	SW	SZ	TH	TK	TW	UK	US	VE	WG	Total
Argentina(AR)	231	2	10	2	43	53	0	25	2	1	0	0	6	2	63	2	1	0	0	4	7	1	19	5	4	0	20	1	23	4	2	0	0	0	1	4	1	1	70	9	17	1	0	0	70	272	4	23	775
Austria(AS)	0	473	5	9	0	17	1	0	2	0	0	0	14	12	34	3	0	3	0	3	8	2	32	12	7	0	1	10	28	0	0	0	3	1	3	4	1	0	5	24	58	0	1	2	54	91	0	297	747
Australia(AU)	1	5	6563	8	6	175	0	2	36	0	0	0	16	9	85	0	51	0	10	42	26	6	17	103	0	43	2	15	76	159	0	8	0	2	1	71	109	4	8	44	74	6	1	3	491	959	0	86	2760
Belgium(BL)	0	12	12	631	4	25	0	1	1	0	0	0	15	21	240	4	1	0	0	12	20	6	22	20	7	1	0	8	247	1	0	0	1	3	3	6	5	0	12	43	30	0	1	1	152	222	0	102	1261
Brazil(BR)	38	4	29	13	1091	76	0	19	11	7	0	0	16	8	137	0	5	0	0	8	9	8	43	29	7	2	33	14	39	4	2	0	0	43	1	9	6	0	73	12	30	0	1	1	65	466	2	75	1345
Canada(CA)	1	11	94	21	13	8790	0	0	29	0	0	1	17	23	182	3	16	2	4	34	17	17	23	81	5	8	7	22	75	7	1	3	1	1	10	17	7	9	12	44	79	1	0	7	371	3070	0	91	4437
Czech Rep. (CC)	0	39	1	15	2	5	236	0	0	0	1	2	13	10	64	1	1	6	0	8	6	3	14	7	5	0	0	11	44	0	0	0	19	0	10	1	0	3	11	30	38	0	0	2	49	97	0	121	639
Chile(CE)	8	0	25	2	10	57	0	151	1	4	0	0	0	1	18	0	0	1	0	2	1	1	9	4	2	0	12	7	14	8	5	0	1	1	0	2	1	0	39	6	2	0	0	0	17	105	1	9	376
China(CH)	0	2	47	15	1	69	0	1	2026	0	0	0	9	10	64	1	378	0	5	10	3	3	17	81	0	59	2	4	27	4	0	6	0	2	1	2	110	57	9	15	13	8	1	43	82	442	0	38	1641
Columbia(CO)	2	0	3	1	9	33	0	7	1	68	0	0	0	1	12	0	0	0	0	3	1	0	1	5	2	1	22	0	3	1	4	1	0	0	0	3	0	0	22	3	8	0	0	0	11	59	4	2	225
Croatia(CT)	0	15	0	0	0	0	1	0	0	0	38	0	3	1	10	1	0	3	0	1	0	0	5	1	0	0	0	0	5	0	0	0	4	1	3	0	0	0	1	2	4	0	1	0	6	5	0	14	87
Cyprus(CY)	0	0	0	0	0	2	0	0	0	0	0	48	1	0	2	13	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	2	0	11	0	2	0	0	0	1	0	1	0	5	5	0	0	48
Denmark(DN)	0	7	4	12	0	13	0	1	2	0	1	1	1187	57	49	1	2	0	0	4	11	3	11	16	4	2	0	140	51	1	0	0	4	0	1	3	5	0	5	245	34	0	0	1	149	219	0	123	1182
Finland(FN)	0	8	7	7	0	22	0	0	1	1	0	1	96	2087	38	1	5	2	0	5	24	3	12	28	6	0	0	64	40	0	0	0	0	0	7	1	5	0	14	349	35	1	1	4	68	178	0	63	1097
France(FR)	3	34	28	269	5	144	0	1	11	0	0	0	59	51	6391	8	19	3	1	22	32	19	212	108	26	2	3	33	231	3	0	0	1	11	3	8	4	3	125	133	191	4	2	2	722	1121	0	499	4156
Greece(GR)	0	2	1	7	0	3	0	0	0	0	0	0	8	3	3	9	451	0	0	0	0	1	12	1	1	0	0	1	9	0	0	0	0	1	3	0	0	1	2	5	5	0	0	0	15	20	0	12	125
Hong Kong(HK)	0	0	31	3	2	33	0	0	98	0	0	0	9	3	19	3	581	0	2	6	0	3	3	41	1	83	0	1	7	1	0	3	0	0	1	3	76	9	1	5	14	5	1	10	74	184	0	19	754
Hungary(HU)	0	39	0	5	0	4	4	0	2	0	1	0	4	9	34	3	0	181	0	1	3	4	14	7	1	0	0	6	46	0	0	0	7	0	4	3	3	0	3	9	13	0	0	1	25	71	0	78	404
Indonesia(ID)	0	0	27	1	0	17	0	0	6	0	0	0	0	2	6	1	9	0	274	16	0	0	0	26	1	55	0	3	5	0	0	3	0	0	0	2	57	15	0	1	5	11	1	1	29	38	0	7	345
India(IN)	0	5	19	6	0	19	0	0	5	0	0	0	7	5	66	0	11	0	0	1369	2	4	11	24	0	25	0	4	24	0	0	2	1	1	6	6	18	9	7	18	40	3	0	1	121	322	0	59	851
Ireland-Rep(IR)	1	2	7	6	0	15	0	0	1	0	0	0	11	1	32	2	2	0	0	3	468	1	5	5	0	2	1	8	18	1	0	0	1	1	2	5	4	0	4	7	7	1	1	0	302	216	0	22	697
Isreal(IS)	0	0	3	3	1	17	0	0	2	0	0	0	3	0	12	0	2	0	0	2	2	220	2	2	0	1	0	0	4	0	0	0	0	0	0	2	1	1	0	4	3	0	2	1	28	225	0	17	340
Italy(IT)	0	37	19	33	8	28	0	0	6	0	0	0	27	33	301	14	14	2	0	27	10	10	2254	44	19	3	1	9	123	1	1	0	2	5	16	4	2	2	57	68	98	1	1	0	234	488	0	228	1976
Japan(JP)	0	0	4	7	2	19	0	0	18	0	0	0	3	3	40	5	13	0	2	2	3	3	5	9273	0	5	0	0	21	0	0	1	0	0	1	2	9	26	1	13	15	3	0	18	57	248	0	37	586
Luxembourg(LX)	0	0	0	16	0	2	0	0	0	0	0	0	1	0	14	2	0	0	0	1	0	0	2	2	11	0	0	0	7	1	0	0	0	0	0	1	0	1	0	5	2	0	0	0	14	17	0	16	104
Malaysia(MA)	0	0	24	0	0	5	0	0	1	0	0	0	6	2	8	0	14	0	6	7	0	1	1	30	0	2132	1	3	7	3	0	5	0	0	1	2	180	8	4	3	10	5	0	5	33	64	0	13	452
Mexico(MX)	3	0	5	2	10	222	0	5	0	3	0	0	5	3	37	3	9	0	0	3	6	1	7	11	1	0	247	1	19	4	1	1	0	0	0	0	2	1	43	8	9	0	0	1	34	360	1	29	850
Norway(NO)	0	6	7	9	5	18	0	0	3	0	1	2	134	73	44	4	1	0	0	7	5	4	7	9	2	1	2	1147	43	0	0	1	2	1	1	1	2	3	4	265	21	1	0	0	145	178	0	58	1070
Netherlands(NT)	0	21	27	135	4	50	1	2	10	0	0	1	40	43	175	6	6	1	0	14	67	11	40	52	10	7	4	25	219	3	0	0	4	3	4	12	5	1	30	67	71	3	3	5	468	501	1	304	2237
New Zealand(NZ)	0	1	346	2	0	48	0	0	4	0	0	0	3	3	13	0	9	0	1	1	5	1	0	22	0	10	0	2	12	773	0	0	0	1	0	11	19	2	0	5	9	3	0	1	77	184	0	12	807
Peru(PE)	2	1	8	1	5	92	0	10	1	1	0	0	0	0	3	0	0	0	0	0	0	0	1	1	0	2	10	2	3	0	73	0	0	1	1	0	0	0	13	1	4	0	0	0	11	58	0	3	235
Philippines(PH)	0	0	10	1	0	12	0	0	0	0	0	0	1	0	7	0	7	0	0	3	0	0	0	14	0	9	2	0	1	0	0	166	0	0	0	1	17	2	1	1	2	6	0	1	14	41	0	3	156
Poland(PL)	0	17	2	7	0	13	9	0	0	0	1	1	31	19	60	4	0	4	1	10	9	4	24	9	13	0	0	17	51	0	0	0	523	5	1	4	1	4	20	31	18	1	0	1	64	84	0	94	634
Portugal(PO)	1	0	4	10	5	8	0	1	1	0	0	1	8	0	51	0	1	2	0	3	3	0	12	5	0	0	1	7	11	0	0	0	0	339	0	1	0	0	90	9	17	0	0	0	48	46	0	26	372
Russian Fed(RU)	0	6	3	10	0	28	3	0	2	0	0	19	8	46	37	6	1	2	0	1	2	2	18	12	8	0	0	10	45	1	0	0	13	0	1748	2	0	5	2	20	24	0	3	0	83	119	0	50	591
South Africa(SA)	0	1	50	3	0	48	0	0	2	0	0	0	5	8	29	2	3	0	0	13	4	1	6	19	0	4	0	2	11	1	0	1	0	0	3	989	4	6	5	19	26	0	0	1	165	128	0	41	611
Singapore(SG)	0	0	46	1	0	7	0	0	22	0	0	0	7	3	16	0	39	1	15	31	0	2	5	42	0	124	0	15	5	0	0	1	1	0	0	5	667	3	2	9	9	16	0	9	56	139	0	19	650
South Korea(SK)	0	1	5	4	0	10	0	0	6	0	0	0	3	3	30	0	7	0	0	2	0	5	1	37	0	0	1	2	7	0	0	0	0	0	1	3	7	1361	4	11	9	0	0	3	32	131	0	26	351
Spin(SP)	2	10	18	32	7	32	2	2	1	1	2	0	42	18	376	11	5	1	0	12	11	11	132	34	1	0	19	19	165	0	1	0	9	69	2	2	1	2	2836	59	51	0	0	1	297	319	0	193	1972
Sweden(SW)	0	17	15	19	0	46	0	0	1	0	0	2	223	283	94	3	6	0	0	8	10	4	19	27	9	1	0	279	79	0	0	0	1	0	2	3	5	1	6	2352	44	0	0	3	265	355	2	135	1967
Switzerland(SZ)	0	54	10	31	0	25	0	0	3	0	1	0	38	18	159	0	9	1	0	10	14	17	45	24	8	4	0	9	60	1	0	1	3	1	10	12	7	0	9	49	1478	0	0	2	120	313	0	415	1483
Thailand(TH)	0	0	5	3	0	2	0	0	0	0	0	0	3	2	9	0	9	0	2	9	0	1	1	48	0	26	0	1	11	2	0	1	1	0	0	4	40	2	0	1	2	285	0	6	26	42	0	9	268
Turkey(TK)	0	12	4	9	3	14	4	0	0	0	0	1	3	5	37	10	2	3	0	3	3	5	13	4	0	0	0	2	11	0	0	0	2	3	8	3	2	0	4	4	9	2	185	0	32	49	0	35	301
Taiwan(TW)	0	0	3	0	0	9	0	0	8	0	0	0	0	2	6	0	18	0	0	0	0	1	0	23	0	6	0	0	1	0	0	2	0	0	0	0	17	5	0	6	3	3	0	238	10	95	0	14	232
United Kingdom(UK)	0	46	233	105	6	396	2	0	13	0	2	3	149	78	662	17	58	3	2	123	477	25	133	204	11	25	5	123	352	16	1	2	2	4	18	116	44	13	87	233	155	27	2	10	18067	3699	1	562	8255
United States(US)	16	58	509	138	56	3389	1	7	76	9	1	4	112	165	1019	33	103	5	8	308	374	219	179	1061	17	31	98	113	563	34	3	11	3	8	38	97	130	79	145	401	450	11	6	93	3607	78513	14	958	14760
Venezuela(VE)	2	0	0	1	4	24	0	1	0	2	0	0	2	0	13	0	0	0	0	1	0	0	4	0	1	0	2	0	2	0	0	0	0	0	0	1	0	0	8	1	3	0	0	0	8	54	49	2	136
Germany(WG)	0	307	43	120	5	93	5	2	11	0	2	0	129	160	539	13	23	4	2	57	36	23	144	151	46	16	5	46	474	5	0	1	16	9	15	31	17	16	55	203	472	2	12	7	775	1711	1	7147	5804
Total	80	782	1753	1104	216	5439	33	87	400	29	13	47	1285	1199	4955	160	861	49	61	843	1211	436	1283	2491	225	558	254	1040	3100	266	21	54	104	178	193	470	926	294	1013	2500	2244	125	42	247	9581	178110	31	5039	71152

Table 15 Continued

Note: This table presents the number of mergers by 48 sample countries. The columns represent acquiring countries. The rows represent target countries. The numbers of cross-border mergers are reported in the off-diagonal entries. The numbers of domestic mergers are reported in the diagonal entries.

Table 16 Descriptive statistics

Variable	Obs.	Mean	Median	Std. Dev.	Q25	Q75	Min.	Max.
Deal order number in the country	53,940	1.50	1.00	1.54	1.00	1.00	1.00	30.00
Time between deals	11,300	778.19	387.00	1013.46	118.00	1047.50	-3065.00	7217.00
% stake acquired	51,099	93.25	100.00	16.82	100.00	100.00	0.00	100.00
% cash payment	11,655	69.66	100.00	40.12	36.65	100.00	0.00	100.00
% stock payment	11,838	21.36	0.00	37.48	0.00	28.73	0.00	534.64
Related M&A	53,940	1.50	1.00	1.54	1.00	1.00	1.00	30.00
Acquirer Size	23,746	13.73	13.86	3.19	12.09	15.60	2.17	21.04
Target Size	1,747	12.04	12.15	2.93	10.58	13.77	1.90	19.36
Acquirer M/B	23,716	3.60	2.38	4.86	1.48	4.02	-7.30	33.11
Target M/B	1,746	2.51	1.71	3.75	0.91	3.04	-8.96	23.47

Note: This table reports summary statistics for the main sample. The sample consists of 53,940 completed cross-border mergers and acquisitions among 48 countries in the period 1990-2010. *Deal order number in the country (DONC)* is the total number of cross-border deals from acquirer *i* into the same target country *j*. *Time between deals (TBD)* is the number of days between the announcement date of the current deal and the completion date of the previous deal in the same country. *% stake acquired* is the percentage of stake acquired. *% cash (stock) payment* is the percentage of cash (stock) payment. *Related M&A* is a dummy equal to one if the target firm is in the same SIC-2 digit industry as the acquirer. *Acquirer (target) size* is the natural logarithm of an acquirer's (target's) market capitalization in U.S. dollars in the prior year. *Acquirer (target) M/B* is acquirer's (target's) market value of equity divided by book value of equity in the prior year. All variables are winsorized at the 1st and 99th percentile levels within year. We present the number of observations, the overall sample mean, median, standard deviation, 25th percentile, 75th percentile, minimum, and maximum.

Table 17 Correlation table

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
[1]	Deal order number	1									
[2]	Time between deals	**-0.174**	1								
		0.00									
[3]	% stake acquired	**0.074**	0.012	1							
		0.00	*0.23*								
[4]	% cash payment	**0.060**	**0.119**	**-0.079**	1						
		0.00	*0.00*	*0.00*							
[5]	% stock payment	**-0.056**	**-0.122**	**0.057**	**-0.833**	1					
		0.00	*0.00*	*0.00*	*0.00*						
[6]	Related M&A	**-0.028**	-0.007	0.004	**-0.037**	**0.034**	1				
		0.00	*0.49*	*0.39*	*0.00*	*0.00*					
[7]	Acquirer Size	**0.076**	**0.096**	**-0.082**	**0.235**	**-0.201**	**-0.045**	1			
		0.00	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*				
[8]	Target Size	**0.066**	0.036	**-0.179**	0.031	-0.014	**0.046**	**0.281**	1		
		0.01	*0.42*	*0.00*	*0.28*	*0.63*	*0.05*	*0.00*			
[9]	Acquirer M/B	**0.035**	**-0.094**	**0.022**	**-0.119**	**0.133**	**0.046**	**0.132**	0.033	1	

Table 17 Continued

		0.00	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.29*		
[10]	Target M/B	**0.079**	-0.015	**0.068**	**-0.055**	**0.082**	**0.043**	0.027	**0.179**	**0.122**	1
		0.00	*0.74*	*0.01*	*0.05*	*0.00*	*0.07*	*0.38*	*0.00*	*0.00*	

Note: This table presents correlations among the main variables. *Deal order number in the country (DONC)* is the total number of cross-border deals from acquirer *i* into the same target country *j*. *Time between deals (TBD)* is the number of days between the announcement date of the current deal and the completion date of the previous deal in the same country. *% stake acquired* is the percentage of stake acquired. *% cash (stock) payment* is the percentage of cash (stock) payment. *Related M&A* is a dummy equal to one if the target firm is in the same SIC-2 digit industry as the acquirer. *Acquirer (target) size* is the natural logarithm of an acquirer's (target's) market capitalization in U.S. dollars in the prior year. *Acquirer (target) M/B* is acquirer's (target's) market value of equity divided by book value of equity in the prior year. All variables are winsorized at the 1st and 99th percentile levels within year.

Table 18 Deal order number, TBD, % acquired, and payment method

Panel A. TBD, %Acquired, and %Cash (Stock) payment across different DONC intervals					
Deal order number in the country (DONC)	Obs.	TBD	%Acquired	%Cash pmt.	%Stock pmt.
1st - 5th deals	52,590	835.17	93.11	69.30	21.66
6th - 10th deals	1,021	384.67	97.98	77.81	15.01
11th - 15th deals	229	280.17	99.41	81.44	10.13
16th deal or more	100	262.60	100.00	79.61	12.33

Table 18 Continued

Panel B. Baseline regression model						
	Dependent variable					
	TBD		%Acquired		%Cash payment	
	[1]		[2]		[3]	
Independent variable	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*
DONC	**-76.560*** **	***-5.46***	**0.206*** **	***4.54***	**1.429*** **	***11.55***
Trend	73.627***	*8.46*	0.099***	*2.62*	-0.199	*-1.22*
ΔGDP per capita	0.031	*0.16*	0.009***	*2.75*	-0.011	*-1.23*
ΔGDP growth rate	1.063	*0.53*	0.019	*0.86*	0.177*	*1.80*
ΔStock market returns	-0.521***	*-2.65*	-0.001	*-1.54*	0.001	*0.24*
ΔCurrency valuation	-6.068**	*-2.38*	-0.062**	*-2.12*	-0.153	*-1.60*
Acquirer country fixed effects	Yes		Yes		Yes	
Target country fixed effects	Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes	
Standard error clustering	Target country		Target country		Target country	
Obs.	11,260		50,544		11,535	
R	0.152		0.102		0.106	

Table 18 Continued

Panel C. Non-linearity						
	Dependent variable					
	TBD		%Acquired		%Cash payment	
	[1]		[2]		[3]	
Independent variable	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*
DONC	**-282.453*** **	***-7.35***	**0.807*** **	***3.50***	**4.893*** **	***4.49***
DONC²	**16.580*** **	***5.30***	**-0.066*** **	***-2.81***	**-0.350*** **	***-3.85***
Trend	75.088***	*10.46*	0.094**	*2.46*	-0.241	*-1.47*
ΔGDP per capita	-0.018	*-0.11*	0.009***	*2.82*	-0.010	*-1.09*
ΔGDP growth rate	1.920	*1.01*	0.019	*0.84*	0.173*	*1.76*
ΔStock market returns	-0.511***	*-2.73*	-0.001	*-1.54*	0.001	*0.26*
ΔCurrency valuation	-6.618***	*-2.76*	-0.062**	*-2.10*	-0.144	*-1.51*
Acquirer country fixed effects	Yes		Yes		Yes	
Target country fixed effects	Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes	
Standard error clustering	Target country		Target country		Target country	
Obs.	11,260		50,544		11,535	

Table 18 Continued

R	0.166	0.102	0.106

Note: This table presents the time between deals (TBD), %acquired, %cash and %stock by the different deal order number in the country (DONC). Panel A reports the average values of the variables for each group categorized based on deal order number: (1) 1st – 5th deals, (2) 6th-10th deals, (3) 11th-15th deals, (4) 16th-20th deals, and (5) 20th deals or more. Panel B reports the estimates of OLS regression coefficients and associated t-statistics, in which the dependent variables are *TBD, %acquired, %cash, and %stock*. *Deal order number in the country (DONC)* is the total number of cross-border deals from acquirer i into the same target country j. *Time between deals (TBD)* is the number of days between the announcement date of the current deal and the completion date of the previous deal in the same country. *% stake acquired* is the percentage of stake acquired. *% cash (stock) payment* is the percentage of cash (stock) payment. *Trend* equals one in 1990 and increases by one for each year afterwards. *ΔGDP per capita* is the difference between acquirer and target countries' annual Gross Domestic Product per capita in the prior year. *ΔGDP growth rate* is the difference between acquirer and target countries' annual growth rate of the Gross Domestic Product (GDP) from the year before the prior year to the prior year. *ΔStock market returns* is the difference between acquirer and target countries' stock market index returns from the prior year to the current year. *ΔCurrency valuation* is the difference in real bilateral U.S. dollar exchange rates from the prior year to the current year between acquirer and target countries. All variables are winsorized at the 1st and 99th percentile levels within year. All regressions include acquire country, target country, and year fixed effects. We report *t-statistics* in parentheses below parameter estimates which are computed using robust standard errors clustered by target country. We use ***, **, * to denote significance at the 1%, 5%, and 10% levels, respectively.

Table 19 Experience building versus memory loss-TBD

	Dependent variable = Abnormal TBD							
	Short TBD (1st quartile)		*Long TBD (4th quartile)*		*Short TBD (1st quartile)*		*Long TBD (4th quartile)*	
Independent variable	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*
DONC	**-66.540****	***-2.48***	106.509	*1.05*				
DONC²	**7.056*****	***2.75***	-7.405	*-0.88*				
Deal order number (DON)					-3.265	*-0.99*	18.775*	*1.91*
DON					0.056	*0.57*	-0.407	*-1.37*
Trend	2.823	*0.83*	-36.983	*-0.44*	3.372	*1.02*	-33.460	*-0.39*
ΔGDP per capita	0.037	*0.22*	-0.110	*-0.25*	0.035	*0.21*	-0.108	*-0.25*
ΔGDP growth rate	-0.183	*-0.13*	3.144	*0.78*	-0.339	*-0.25*	3.243	*0.78*
ΔStock market returns	0.396**	*2.06*	0.272	*0.35*	0.395**	*2.07*	0.306	*0.39*
ΔCurrency valuation	-0.097	*-0.07*	-6.631*	*-1.79*	0.236	*0.17*	-6.473*	*-1.69*
Acquirer country fixed effects	Yes		Yes		Yes		Yes	
Target country fixed effects	Yes		Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes		Yes	
Standard error clustering	Target country		Target country		Target country		Target country	
Obs.	2,801		2,821		5,621		5,639	

Table 19 Continued

R	0.123	0.187	0.114	0.187

Note: This table presents the relation between the abnormal time between deals (TBD) and the deal order number in the country (DONC) in the experience-building periods (1st quartile of TBD) and the memory-loss periods (4th quartile of TBD). The table reports the estimates of OLS regression coefficients and associated t-statistics. The dependent variable is *abnormal TBD* defined as the TBD minus the median TBD of its industry, in which three-digit SIC codes are used for industry classification. *Time between deals (TBD)* is the number of days between the announcement date of the current deal and the completion date of the previous deal in the same country. *Deal order number in the country (DONC)* is the total number of cross-border deals from acquirer i into the same target country j. *Deal order number (DON)* is the total number of cross-border deals from acquirers into any target country. *Trend* equals one in 1990 and increases by one for each year afterwards. *ΔGDP per capita* is the difference between acquirer and target countries' annual Gross Domestic Product per capita in the prior year. *ΔGDP growth rate* is the difference between acquirer and target countries' annual growth rate of the Gross Domestic Product (GDP) from the year before the prior year to the prior year. *ΔStock market returns* is the difference between acquirer and target countries' stock market index returns from the prior year to the current year. *ΔCurrency valuation* is the difference in real bilateral U.S. dollar exchange rates from the prior year to the current year between acquirer and target countries. All variables are winsorized at the 1st and 99th percentile levels within year. All regressions include acquire country, target country, and year fixed effects. We report *t-statistics* in parentheses below parameter estimates which are computed using robust standard errors clustered by target country. We use ***, **, * to denote significance at the 1%, 5%, and 10% levels, respectively.

Table 20 Summary statistics for merger performance

Variable	Obs.	Mean	Median	Std. Dev.	Q25	Q75	Min.	Max.
Panel A. All sample								
Bidder CAR (-1,+1)	26,002	0.876***	0.217***	5.489	-14.616	-1.466	2.385	26.238
Bidder CAR (-2, +2)	26,002	1.130***	0.359***	6.991	-18.440	-2.016	3.397	31.467
Bidder CAR (-3, +3)	26,002	1.279***	0.426***	8.141	-21.103	-2.481	4.063	36.783
Panel B. DONC = 1								
Bidder CAR (-1,+1)	17,945	0.985***	0.235***	5.782	-14.616	-1.513	2.561	26.238
Bidder CAR (-2, +2)	17,945	1.248***	0.382***	7.332	-18.440	-2.077	3.599	31.467
Bidder CAR (-3, +3)	17,945	1.416***	0.454***	8.540	-21.103	-2.557	4.255	36.783
Panel C. DONC > 1								
Bidder CAR (-1,+1)	8,057	0.635***	0.190**	4.765	-14.616	-1.353	2.084	26.238
Bidder CAR (-2, +2)	8,057	0.868***	0.304***	6.159	-18.440	-1.911	2.983	31.467
Bidder CAR (-3, +3)	8,057	0.975***	0.374***	7.165	-21.103	-2.318	3.695	36.783

Note: This table presents summary statistics for the acquirer abnormal announcement returns. *CAR (-n,+n)* is acquirer cumulative abnormal stock return from *n* days before to *n* days after the announcement. All variables are winsorized at the 1st and 99th percentile levels within year. We use ***, **, * to denote significance at the 1%, 5%, and 10% levels, respectively

Table 21 Acquirer abnormal announcement returns (CARs)

	CAR(-1, +1)		CAR(-2, +2)		CAR(-3, +3)		CAR(-3 +3)	
	[1]		[2]		[3]		[4]	
Independent variable	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*
DONC	**-0.146****	***-2.39***	**-0.212****	***-2.05***	**-0.295*****	***-4.36***		
DONC²	**0.010****	***2.36***	**0.019***	***1.69***	**0.023*****	***4.12***		
Dummy (1st - 5th deals)							-0.270	*-0.92*
Dummy (6th - 10th deals)							**-0.782***	***-1.78***
Dummy (11th - 15th deals)							**-0.884*****	***-3.10***
Acqurier size	-0.088***	*-2.73*	-0.098**	-2.56	-0.238***	*-10.03*	-0.247***	*-10.79*
Acquirer M/B	0.001	*0.05*	-0.007	-0.40	0.023	*1.50*	0.023	*1.54*
Public target	-0.230	*-1.52*	-0.355	*-1.53*	-0.436*	*-1.80*	-0.421*	*-1.74*
Related M&A	0.017	*0.26*	0.074	*0.75*	0.076	*0.90*	0.080	*0.97*
Stock deal	0.237	*0.98*	0.432	*1.56*	0.212	*0.69*	0.232	*0.76*
Trend	0.059***	*4.25*	0.064***	*3.83*	0.071***	*2.58*	0.065**	*2.44*
ΔGDP per capita	-0.001	*-1.14*	-0.001	*-0.61*	0.0001	*0.11*	0.0001	*0.12*
ΔGDP growth rate	-0.004	*-0.77*	-0.009	*-1.60*	0.003	*0.53*	0.003	*0.52*
Δstock market returns	-0.002	*-0.44*	0.008	*1.38*	0.007	*1.23*	0.007	*1.28*
Δcurrency valuation	0.007	*1.37*	0.020***	*3.21*	0.005	*0.07*	0.001	*0.11*

Table 21 Continued

Acquirer country F.E.	Yes	Yes	Yes	Yes
Target country F.E.	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes
Standard error clustering	Target country	Target country	Target country	Target country
Obs.	22,036	22,036	22,036	22,036
R	0.067	0.067	0.067	0.022

Note: This table reports the estimates of OLS regression coefficients and associated t-statistics, in which the dependent variable is *bidder CAR (-n,+n)*. *CAR (-n,+n)* is acquirer cumulative abnormal stock return from *n* days before to *n* days after the announcement. *Deal order number in the country (DONC)* is the total number of cross-border deals from acquirer i into the same target country j. *Dummy (1st - 5th deals)* equals one if a given deal is one of the acquirer's 1st to 5th deals in the target country. *Dummy (6th – 10th deals)* equals one if a given deal is one of the acquirer's 6th to 10th deals in the target country. *Dummy (11th – 15th deals)* equals one if a given deal is one of the acquirer's 11th to 15th deals in the target country. *Acquirer size* is the natural logarithm of an acquirer's market capitalization in U.S. dollars in the prior year. *Acquirer M/B* is acquirer's market value of equity divided by book value of equity in the prior year. *Public target* is a dummy equal to one if the target is a public company. *Related M&A* is a dummy equal to one if the target firm is in the same SIC-2 digit industry as the acquirer. *Stock deal* is a dummy equal to one if a deal is financed at least partially by stock. *Trend* equals one in 1990 and increases by one for each year afterwards. *ΔGDP per capita* is the difference between acquirer and target countries' annual Gross Domestic Product per capita in the prior year. *ΔGDP growth rate* is the difference between acquirer and target countries' annual growth rate of the Gross Domestic Product (GDP) from the year before the prior year to the prior year. *ΔStock market returns* is the difference between acquirer and target countries' stock market index returns from the prior year to the current year. *ΔCurrency valuation* is the difference in real bilateral U.S. dollar exchange rates from the prior year to the current year between acquirer and target countries. All variables except dummy variables are winsorized at the 1st and 99th percentile levels within year. All regressions include acquire country, target country, and year fixed effects. We report *t-statistics* in parentheses below parameter estimates which are computed using robust standard errors clustered by target country. We use ***, **, * to denote significance at the 1%, 5%, and 10% levels, respectively.

Table 22 Experience building versus memory loss – CAR

Panel A. CAR and DONC

	CAR(-1, +1)				CAR(-2, +2)				CAR(-3,+3)			
	Short TBD		*Long TBD*		*Short TBD*		*Long TBD*		*Short TBD*		*Long TBD*	
	[1]		[2]		[3]		[4]		[5]		[6]	
Independent variable	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*
DONC	**0.759****	***2.46***	0.199	*0.69*	**0.692***	***1.84***	0.265	*0.77*	**0.796****	***1.98***	0.057	*0.12*
DONC²	**-0.072*****	***-2.64***	-0.035	*-1.27*	**-0.062***	***-1.84***	-0.043	*-1.31*	**-0.077****	***-2.06***	-0.025	*-0.60*
Acqurier size	-0.121***	*-2.71*	-0.132***	*-4.43*	-0.184***	*-2.99*	-0.181***	*-4.39*	-0.192***	*-4.06*	-0.094**	*-2.36*
Acqurier M/B	0.040	*1.01*	-0.025	*-0.95*	0.056	*1.44*	0.000	*-0.01*	0.065	*1.58*	0.012	*0.45*
Public target	-0.310	*-0.42*	-0.615	*-1.24*	-0.286	*-0.25*	-0.717	*-1.33*	0.114	*0.09*	-0.555	*-0.94*
Related M&A	-0.225	*-0.90*	0.339**	*2.23*	-0.170	*-0.63*	-0.060	*-0.2*	-0.242	*-0.86*	-0.143	*-0.43*
Stock deal	0.010	*0.02*	0.716	*1.07*	0.648	*0.51*	1.741**	*2.19*	0.511	*0.45*	1.545*	*1.95*
Trend	0.024	*0.45*	0.125	*0.22*	-0.012	*-0.25*	0.819	*1.14*	0.052	*0.87*	0.444	*0.42*
ΔGDP per capita	0.000	*0.05*	-0.0009	*-0.37*	0.000	*0.09*	-0.0013	*-0.53*	-0.001	*-0.27*	-0.0004	*-0.21*
ΔGDP growth rate	-0.008	*-0.33*	0.007	*0.21*	-0.031	*-1.21*	0.024	*0.70*	0.014	*0.47*	0.015	*0.37*
ΔStock market returns	0.000	*-0.01*	-0.001	*-0.15*	0.002	*0.91*	-0.003	*-0.71*	-0.003	*-0.97*	-0.002	*-0.39*
ΔCurrency valuation	-0.003	*-0.11*	-0.033	*-1.14*	0.040	*1.40*	-0.038	*-1.05*	-0.005	*-0.15*	-0.032	*-0.79*
Acquirer country F.E.	Yes		Yes		Yes		Yes		Yes		Yes	

Table 22 Continued

Target country F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Standard error clustering	Target country	Target country	Target country	Target country	Target country	Target country
Obs.	1,648	1,938	1,648	1,938	1,648	1,938
R	0.064	0.067	0.065	0.080	0.065	0.073

Table 22 Continued

Panel B. CAR and DON

	CAR(-1, +1)				CAR(-2, +2)				CAR(-3,+3)			
	Short TBD		*Long TBD*		*Short TBD*		*Long TBD*		*Short TBD*		*Long TBD*	
	[1]		[2]		[3]		[4]		[5]		[6]	
Independent variable	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*
DON	-0.010	*-0.18*	0.027	*0.64*	0.052	*0.82*	0.016	*0.39*	0.007	*0.10*	0.050	*1.01*
DON²	0.000	*-0.06*	-0.001	*-0.81*	-0.001	*-0.67*	-0.001	*-0.50*	0.000	*-0.08*	-0.002	*-1.40*
Acqurier size	-0.113***	*-2.76*	-0.143***	*-5.86*	-0.197***	*-2.97*	-0.193***	*-5.07*	-0.200***	*-3.56*	-0.109***	*-2.58*
Acqurier M/B	0.037	*0.99*	-0.023	*-0.87*	0.056	*1.49*	0.002	*0.07*	0.063	*1.58*	0.015	*0.58*
Public target	-0.368	*-0.51*	-0.594	*-1.20*	-0.313	*-0.28*	-0.692	*-1.28*	0.070	*0.06*	-0.531	*-0.90*
Related M&A	-0.215	*-0.88*	0.343**	*2.18*	-0.165	*-0.61*	-0.056	*-0.19*	-0.236	*-0.83*	-0.134	*-0.43*
Stock deal	-0.031	*-0.06*	0.737	*1.11*	0.657	*0.52*	1.754**	*2.19*	0.508	*0.46*	1.591**	*2.00*
Trend	0.040	*0.77*	0.083	*0.15*	-0.007	*-0.15*	0.770	*1.09*	0.060	*0.99*	0.387	*0.38*
ΔGDP per capita	0.000	*-0.01*	-0.001	*-0.41*	0.000	*0.03*	-0.001	*-0.56*	-0.001	*-0.31*	-0.001	*-0.29*
ΔGDP growth rate	-0.004	*-0.17*	0.008	*0.26*	-0.028	*-1.05*	0.025	*0.77*	0.017	*0.56*	0.017	*0.42*
ΔStock market returns	0.000	*-0.08*	-0.001	*-0.23*	0.002	*0.81*	-0.003	*-0.79*	-0.003	*-1.01*	-0.002	*-0.45*
ΔCurrency valuation	-0.009	*-0.29*	-0.035	*-1.26*	0.035	*1.20*	-0.041	*-1.14*	-0.010	*-0.30*	-0.035	*-0.87*
Acquirer country F.E.	Yes		Yes		Yes		Yes		Yes		Yes	

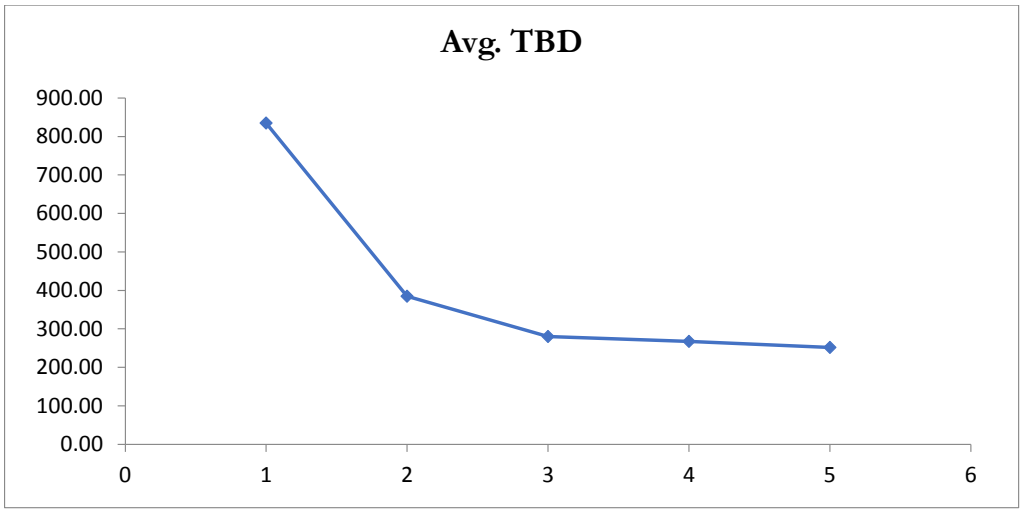
Table 22 Continued

Target country F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Standard error clustering	Target country	Target country	Target country	Target country	Target country	Target country
Obs.	1,648	1,938	1,648	1,938	1,648	1,938
R	0.06	0.066	0.063	0.079	0.063	0.077

Note: This table presents the relation between the acquirer abnormal announcement returns (CAR) and the deal order number in the country (DONC) in the experience building periods (1st quartile of TBD) and the memory loss periods (4th quartile of TBD). The table reports the estimates of OLS regression coefficients and associated *t-statistics*, in which the dependent variable is *CAR*. *Deal order number in the country (DONC)* is the total number of cross-border deals from acquirer *i* into the same target country *j*. *Time between deals (TBD)* is the number of days between the announcement date of the current deal and the completion date of the previous deal in the same country. *Acquirer size* is the natural logarithm of an acquirer's market capitalization in U.S. dollars in the prior year. *Acquirer M/B* is acquirer's market value of equity divided by book value of equity in the prior year. *Public target* is a dummy equal to one if the target is a public company. *Related M&A* is a dummy equal to one if the target firm is in the same SIC-2 digit industry as the acquirer. *Stock deal* is a dummy equal to one if a deal is financed at least partially by stock. *Trend* equals one in 1990 and increases by one for each year afterwards. *Trend* equals one in 1990 and increases by one for each year afterwards. *ΔGDP per capita* is the difference between acquirer and target countries' annual Gross Domestic Product per capita in the prior year. *ΔGDP growth rate* is the difference between acquirer and target countries' annual growth rate of the Gross Domestic Product (GDP) from the year before the prior year to the prior year. *ΔStock market returns* is the difference between acquirer and target countries' stock market index returns from the prior year to the current year. *ΔCurrency valuation* is the difference in real bilateral U.S. dollar exchange rates from the prior year to the current year between acquirer and target countries. All variables except dummy variables are winsorized at the 1st and 99th percentile levels within year. All regressions include acquire country, target country, and year fixed effects. We report *t-statistics* in parentheses below parameter estimates which are computed using robust standard errors clustered by target country. We use ***, **, * to denote significance at the 1%, 5%, and 10% levels, respectively.

Figure 1 Deal order number in the country and TBD, % acquired, and payment method

Panel A Time between deals (TBD)



Panel B % stake acquired

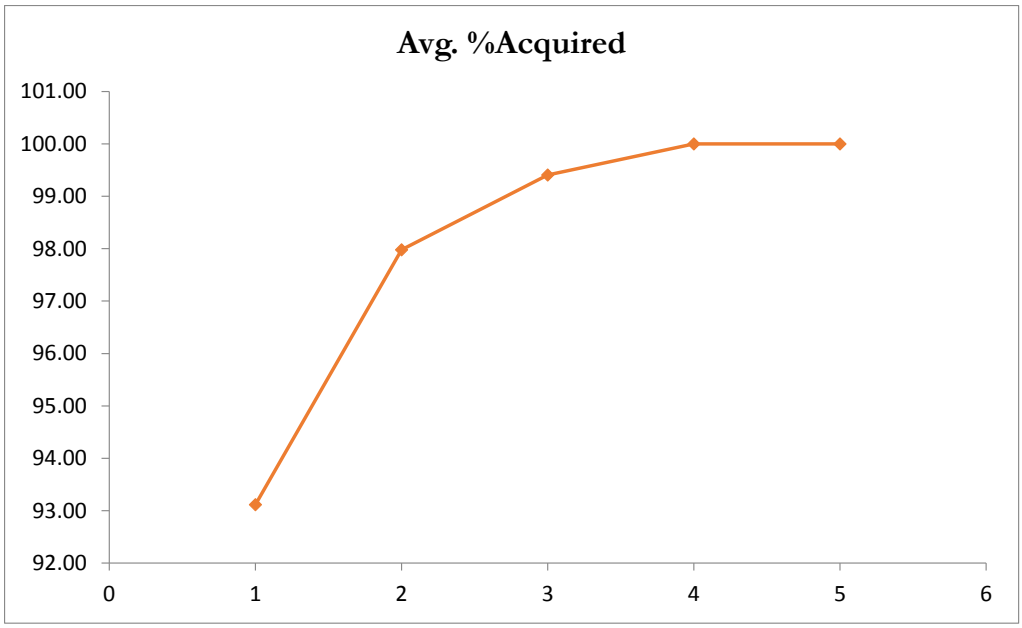
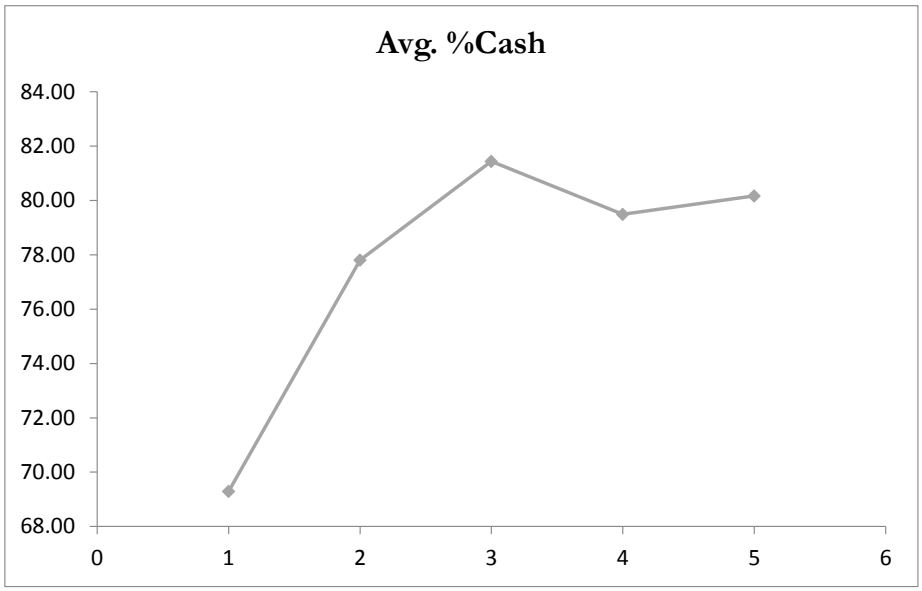


Figure 1 Continued

Panel C Percentage of cash payment



APPENDIX A VARIABLE DEFINITIONS

Within wave: Dummy equal to one if the cross-border deal takes place in a merger wave. For the definition of merger waves, please refer to Data section.

First mover: Dummy equal to one if the deal belongs to the first 20% of acquisitions undertaken during a merger wave.

Related M&A: Dummy equal to one if the target firm is in the same Fama-French 12 industry as an acquirer.

Public target: Dummy equal to one if the target is a public firm.

% Cash (stock) payment: The percentage of cash (stock) payment. Source: SDC.

All cash (stock) deal: Dummy equal to one if a deal is financed solely by cash (stock). Source: SDC.

Mixed payment deal: Dummy equal to one if a deal is financed by a mixture of cash and stock. Source: SDC.

Relative size: The ratio of the transaction value to the acquirer's total assets (AT) in the prior year.

Size (t): The natural logarithm of a firm's total assets (AT) in year t.

M/B (t): The ratio of the market value (AT – CEQ + PRCC_F*CSHO), to book value of assets (AT) in year t.

CAR (-3,+3): The cumulative abnormal stock return from 3 days before to 3 days after the announcement.

Stock price runup: The buy-and-hold cumulative abnormal returns (BHCAR) for acquirers from 210 days to 11 days before the announcement.

ROA (t): The ratio of net income (IB) to total assets (AT) in year t.

Δ*Market share (t)*: Industry-adjusted sales growth from t-1 to t.

R&D (t): The ratio of R&D expense (XRD) to sales (SALE) in year t.

Firm age: The natural logarithm of years since the first year the firm appears in CRSP tapes.

Peer CAR (t-1): The average CAR of Cross-border M&As undertaken by the same Fama-French 12 industry acquirers in the same target country in the quarter prior to the deal of interest.

Peer CAR (t-2 to t-1): The average CAR of Cross-border M&As undertaken by the same Fama-French 12 industry acquirers in the same target country in the previous two quarters prior to the deal of interest.

Non-peer CAR: The average CAR of Cross-border M&As undertaken by firms from all other industries based on Fama-French 12 industry classification into the same target country.

Merger synergy: The weighted average of acquirer's abnormal returns and target's abnormal dollar returns from 3 days before to 3 days after the announcement date, in which weights are based on the market values of the acquirer and the target 50 days before the announcement.

ΔOperating performance: The acquirer's operating performance in year t+3 (or year t+4) minus operating performance in year t+1, in which year t is the deal announcement year. Operating performance in year t is defined as net income before extraordinary items in year t scaled by net sales in year t (i.e., return on sales) minus the median of this ratio for firms in the same Fama-French 12 industry

ΔGDP per capita (t): Difference between acquirer and target countries' annual Gross Domestic Product per capita in year t. Source: World Bank.

ΔGDP growth rate (t): Difference between acquirer and target countries' annual growth rate of the Gross Domestic Product (GDP) from year t-1 to year t. Source: World Bank.

ΔStock market returns (t): Difference between acquirer and target countries' stock market index returns from year t-1 to year t. Source: Datastream.

ΔCurrency valuation (t): Difference in real bilateral US dollar exchange rates from year t-1 to year t between acquirer and target countries. Source: Datastream.

GDP growth (t): Growth rate of the Gross Domestic Product (GDP) of the target country from year t-1 to year t. Source: World Bank.

Log(GDP per capita) (t): The natural logarithm of the Gross Domestic Product per capita of the target country in year t. Source: World Bank.

Same language: Dummy equal to one if acquiring country and target country speak the same language. Source: World Factbook. (i.e. Dummy equal to one if the target country speaks English.)

Same religion: Dummy equal to one if acquiring country and target country share the same religion. Source: World Factbook. (i.e. Dummy equal to one if the target country's primary religion is Protestant or Catholic.)

Gdistance: Geographical distance between the capital of acquiring country and the capital of target country. Source: World Factbook and Erel, Liao, and Weisbach (2012).

Common law: Dummy equal to one if the target country is a common law origin country. Source: La Porta et al. (1998).

Rule of law: Assessment of the law and order tradition in the target country generated by the country risk rating agency International Country Risk (ICR). Source: La Porta et al. (1998).

Deal order number in the country (DONC): The number of cross-border deals (including the current deal) made by the acquirer i in the country j. Source: SDC.

Time between deals (TBD): The number of days between the announcement date of the current deal and the completion date of the previous deal in the same country. Source: SDC.

Related M&A: A target firm is in the same SIC-2 digit industry as an acquirer.

% Stake acquired: The percentage of stake acquired. Source: SDC.

Stock deal: Dummy equal to one if a deal is financed at least partially by stock. Source: SDC.

Acquirer (target) size (t): The natural logarithm of an acquirer's (target's) market capitalization in US dollars in year t. Source: Datastream item 08001.

Acquirer (target) M/B (t): Acquirer's (target's) market value of equity (Datastream item 08001) divided by book value of equity (Datastream item 03501) in year t. Source: Datastream.

HCR: Human capital relatedness between merging firms in the fiscal year prior to the deal announcement date. For merging firms *i* and *j*, HCR_{ij} is computed as the scalar product of the firms' human capital profile vectors, H_i and H_j, divided by the product of their lengths, i.e.,

$$HCR_{ij} = \frac{H_i H_j'}{\sqrt{(H_i H_i')(H_j H_j')}}$$

A firm's human capital profile vector is constructed as the weighted average of its industry segment occupation profile vectors where the weights are industry segment sales to total segment sales. Industry occupation profile vectors are from the Occupational Employment Statistics (OES) of the Bureau of Labor Statistics. For each 3-digit SIC code for years 1989-2001 and 4-digit NAICS code thereafter, OES reports an industry occupation profile vector where the elements are the number of industry workers assigned to an occupation divided by the total number of workers in the industry. The OES dataset includes 158 broad occupational titles based on the OES taxonomy up to 1998 and 444 broad occupational titles based on the Standard Occupational Classification (SOC) thereafter. When a firm does not have data in the Compustat segment database, we use industry segment information from the Securities Data Corporation (SDC) database. The SDC database reports SIC codes and NAIC codes for a firm's segments but it does not provide segment sales. We therefore compute a firm's human capital profile vector as the equally weighted average of its segment OES occupation profile vectors. This measure is bounded between 0 and 1 for all merging firms. It is unity for firms whose human capital profiles are identical and zero for firms whose human capital profiles are orthogonal.

PMR: Dummy variable equal to one if two firms are identified as product market related by Hoberg and Phillips (2010). Hoberg and Phillips compute product market similarity scores between firms using information in 10-K annual filings and define firms with similarity scores above a certain threshold as product market related.

Synergy (-n, +n): The weighted-average cumulative abnormal stock returns of acquirer and target from n days before and after the merger announcement date. The weights are computed using the market values of equity of the merging firms 4 days before the merger announcement date. Using CRSP equally-weighted market returns, we estimate market model parameters over the period from 210 days before to 11 days before the merger announcement date. Abnormal stock returns are computed as a firm's raw stock returns minus the predicted returns from the market model.

Acquirer (target) CAR (-n, +n): Acquirer (target) firm cumulative abnormal stock returns from n days before and after the merger announcement date. Abnormal returns are computed using a market model estimated over the period from 210 days before to 11 days before the merger announcement date.

Relative size_1: The ratio of the target firm's market value of equity to the acquiring firm's market value of equity 4 days before the merger announcement date.

Total assets: Natural logarithm of total book assets (AT) at the fiscal year-end immediately prior to the merger announcement date.

Market-to-book: The market-to-book ratio of a firm's assets at the fiscal year-end immediately prior to the merger announcement date, where the market value of assets is estimated as the book value of assets plus the difference between the market and book values of equity (AT + PRCC_F × CSHO * CEQ).

Leverage: Ratio of long-term debt (DLTT) plus short-term debt (DLC) to total book assets (AT) at the fiscal year-end immediately prior to the merger announcement date.

Free cash flow: Ratio of operating income before depreciation (OIBDP) minus interest expense (XINT) minus income taxes (TXT) minus capital expenditures (CAPX) to total book assets (AT) at the fiscal year-end immediately prior to the merger announcement date.

Cash holdings: Ratio of cash (CH) plus cash equivalents (CHE) to total book assets (AT) at the fiscal year-end immediately prior to the merger announcement date.

Sales growth: Sales (SALE) in fiscal year t-1 minus sales in fiscal year t-2, scaled by sales in fiscal year t-2, where fiscal year t is the year of the merger announcement.

Prior returns: Buy-and-hold abnormal stock returns during the period from 210 days before to 11 days before the merger announcement date (day 0). Abnormal stock returns are computed as the difference between a firm's raw stock returns and the CRSP value-weighted market returns.

Return on assets: Ratio of operating income before depreciation (OIBDP) to total book assets (AT) at the fiscal year-end immediately prior to the merger announcement date.

Termination fee: Dummy variable equal to one if the acquirer (target) termination fee reported by SDC is greater than zero.

APPENDIX B EXAMPLE OF THE COMPUTATION OF HUMAN CAPITAL MARKET RELATEDNESS

We provide a simple example to illustrate the calculation of our human capital relatedness (*HCR*) measure. Consider an economy with three occupations (*A*, *B*, and *C*), two industries, and three firms (*X*, *Y*, and *Z*). In Industry 1, 50% of the worker force is in Occupation *A*, 20% is in Occupation *B*, and 30% is in Occupation *C*. In Industry 2, 70% of the work force is in Occupation *B* and 30% is in Occupation *C*. The occupation profile vectors for Industries 1 and 2 are (0.5, 0.2, 0.3) and (0, 0.7, 0.3), respectively.

A firm's human capital profile vector is the weighted average of its industry segment occupation profile vectors, where the weights are industry segment sales to total segment sales. For our example, assume that 60% of Firm *X*'s sales come from Industry 1 and 40% comes from Industry 2. Thus Firm *X*'s human capital profile is H_X = (0.6)(0.5, 0.2, 0.3) + (0.4)(0. 0.7, 0.3) = (0.3, 0.4, 0.3). Similarly, assume Firm *Y* generates all of its sales from Industry 1 and Firm *Z* generates 20% of its sales from Industry 1 and 80% from Industry 2. The human capital profiles of Firms *Y* and *Z* are H_Y = (0.5, 0.2, 0.3) and H_Z = (0.1, 0.6, 0.3), respectively.

We compute the human capital relatedness of Firms *X* and *Y* as the angular separation or uncentered correlation of the vectors H_X and H_Y:

$$HCR_{XY} = \frac{H_X H_Y'}{\sqrt{(H_X H_X')(H_Y H_Y')}} = 0.89$$

Thus HCR_{XY} is simply the scalar product of the firms' human capital profile vectors divided by the product of their lengths. Note that the human capital measure is bounded between 0 and 1; it is unity for firms whose human capital profiles are identical

and zero for firms whose human capital profiles are orthogonal. Repeating the calculation for Firms *X* and *Z* and Firms *Y* and *Z*, we obtain $HCR_{XZ} = 0.91$ and $HCR_{YZ} = 0.62$, respectively. Note that although Firm *X* appears more similar to Firm *Y* than to Firm *Z* (i.e., the sales of Firms *X* and *Y* depend more on Industry 1, whereas Firm *Z*'s sales are more heavily weighted toward Industry 2), Firm *X* is more closely related to Firm *Z* with respect to human capital.

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