Enterprise Systems and Mergers and Acquisitions

A Dissertation
SUBMITTED TO THE FACULTY OF
UNIVERSITY OF MINNESOTA
BY

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IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

Gautam Ray

July 2017

Acknowledgements

This dissertation would be dedicated to my beloved parents, Xiuping Yang and Yunjiang Cao, my husband Joseph Svec, and my son Harvey Svec.

Then I wish to express my most sincere gratitude to my advisor Gautam Ray. He is a great mentor. Throughout the process of forming ideas, sharpening the theoretical arguments, collecting and analyzing data, he has given me inspiration, directions and support to say the least. My sincere gratitude also goes to Dr. Mani Subramani and Dr. Alok Gupta. Their suggestions made it possible for this dissertation to be as good as it is today. Then, I also appreciate the help and support everyone in my department has given me. The kind and inspiring words I heard from Ali Mahdavi Adeli, Yash Babar, Swanand Deodhar and Yaqiong Wang during the coffee breaks we took together encouraged me to go further in this journey.

Dedication

This dissertation is dedicated to my husband Joseph Svec and my son Harvey Svec, who always remind me the true meaning of life.

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Enterprise Systems and Mergers and Acquisitions

Introduction

Mergers and Acquisitions (M&As) have become increasingly popular in the last few decades. M&As are used by firms to acquire new resources and redeploy existing resources in new contexts. The value-generating potential of M&A explains the number and size of M&A (Cartwright and Schoenberg 2006). In 2014, 82,354 M&A were completed around the world with a total deal value of 4,708 billion U.S. Dollars (Bureau van Dijk 2014). Given the scale of M&A, our overall understanding of M&A actions is fragmented and a fundamental managerial logic that unifies these disparate streams is lacking. Therefore, my dissertation tries to unpack the value creation effects of M&A from the standpoint of efficiency enhancement and resource coordination.

M&As allow firms to extend the deployment of their existing resources and capabilities to novel contexts, creating value by improving the performance of the acquired firm (Berchicci, Dowell, and King, 2012). Additionally, acquisitions are also a means for the acquirers to obtain new resources and capabilities, allowing them to bridge capability gaps (Capron and Mitchell, 2009) and enter new markets (Helfat and Lieberman, 2002). Whether an M&A is executed to derive value from deploying current resources to novel contexts or for new resource acquisition, the ability to ***appropriately integrate the processes*** of target and acquiring firms is the single most important factor is realizing synergy (Larsson and Finkelstein, 1999) and enhancing the performance of the combined firm (Zollo and Singh, 2004).

Increasingly, the ability of firms to integrate resources and processes depends largely on the coordination capabilities provided by enterprise systems such as ERP Systems, CRM systems and SCM systems. As information systems become increasingly central to the management and operational control of enterprises, it is thus not a surprise that recent studies highlight that realized outcomes in M&A initiatives hinge on the challenges of merging the complex information systems of target and the acquiring firms (Yoo, Lyytinen, Heo 2004; Mehta and Hirschheim 2007). Consistent with the resource-based view of value creation in firms I suggest that ***enterprise systems*** installed at the acquiring and target firms are ***central facilitators of the integration processes in M&A initiatives***.

Therefore, given the significance of M&A transactions and the central role enterprise systems play in the integration process, my dissertation examines the impacts and mechanisms of enterprise systems on the value creation in M&As. There are two chapters in this dissertation. The first chapter looks specifically at the role that enterprise systems play in the likelihood of a firm getting involved in M&As. The second chapter examines the premiums and performance of M&A deals from a coordination capabilities perspective: premiums paid and value realized are likely to be related to the coordination capabilities linked to Enterprise Systems in acquiring and target firms.

Chapter I: Impact of Enterprise Systems on Mergers and Acquisitions

1 INTRODUCTION

Mergers and Acquisitions (M&A) are used by firms to acquire new resources and redeploy existing resources in new contexts. The value-generating potential of M&A explains the number and size of M&A (Cartwright and Schoenberg 2006). In 2014, 82,354 M&A were completed around the world with a total deal value of 4,708 billion U.S. Dollars (Bureau van Dijk 2014). Prior research suggests a variety of efficiency oriented arguments for M&A such as cost reduction or profit enhancement from using production capacity more effectively (Sheth and Larson 1990; Singh and Montgomery 1987), sharing knowledge among operating units (Morck and Yeung 1998), and umbrella branding of products (Wernerfelt 1988). In contrast to the above synergy (efficiency) based logic, prior work also presents alternative motivations for M&A from an anti-competitive perspective. Horizontal M&A can have anti-competitive effects if they lead to collusion, while non-horizontal M&A can be anti-competitive if they result in foreclosure or collusion. A vertical takeover of a supplier (or customer) can deny access to critical inputs (or outlets/markets) to its nonintegrated rivals (i.e., the foreclosure motivation, Shenoy 2012) or act as a mechanism that facilitates the flow of information between the integrated firm and its nonintegrated rivals (i.e., the collusion motivation, Shenoy 2012). These arguments highlight M&A as a way for a firm to gain efficiency or

market power through exclusive access to key resources in its primary, upstream, and downstream industries.

There is a large body of research in IS that takes an efficiency perspective and examines how information technology (IT) impacts firm boundaries by reducing internal and external coordination costs (e.g., Brynjolfsson et al. 1994; Clemons et al. 1993; Dewan and Min 1998; Gurbaxani and Whang 1991; Hitt 1999; Malone et al. 1987; Forman and Gron 2011). The empirical findings of this literature suggest that IT may reduce internal as well as external coordination costs as IT is associated with more diversified and less vertically integrated firms (Dewan and Min 1998; Hitt 1999). There are also studies about the impact of IT on strategic alliances (Tafti et al. 2013; Liu and Ravichandran 2015). However, the study of how IT, and in particular enterprise systems such as enterprise resource planning (ERP), customer relationship management (CRM) and supply chain management (SCM) systems impact firm boundaries through M&A has been underexplored. At their core, enterprise systems enable monitoring and coordination of activities within and across organizations. Thus, the internal coordination capabilities provided by ERP, CRM, and SCM systems can reduce agency costs associated with operating a larger (i.e., the focal and the acquired) firm and thereby increase the motivation to engage in horizontal, vertical, and conglomerate M&A. However, the external coordination capabilities provided by CRM and SCM systems can reduce the transaction cost to monitor and coordinate activities with downstream partners and upstream suppliers and reduce the need for costly and risky vertical M&A. The relationship between ERP, CRM, and SCM systems and M&A may also be contingent on

the characteristics of the focal firm and its industry environment. The size of the focal firm, or the unpredictability of downstream demand, or the market power of suppliers, may encourage focal firms to use ownership-based coordination, and ERP, CRM, and SCM systems may be related with more M&A. Thus, the goal of this paper is to examine the relationship between ERP, CRM, and SCM systems and horizontal, vertical, and conglomerate M&A.

This study uses a panel dataset of 707 Fortune 1000 firms that executed 1,973 M&A deals from 2009 to 2014 and makes key theoretical and empirical contributions. The theoretical contribution of this paper is to explicate how by reducing agency and transaction costs, enterprise systems such as ERP, CRM and SCM systems may influence the likelihood of horizontal, vertical, and conglomerate M&A. The empirical contribution of this study is the finding that ERP, CRM, and SCM systems are related with horizontal, vertical, and conglomerate M&A in distinctive ways. Since ERP systems can reduce internal coordination costs, ERP systems are related with horizontal and conglomerate acquisitions, and that this effect is stronger for larger firms; and since CRM and SCM systems can reduce the cost of coordination with downstream partners and upstream suppliers, CRM and SCM systems are associated with the reduced likelihood of vertical M&A. However, if the focal industry faces very unpredictable demand, or if the supplier industry is very concentrated, CRM and SCM systems are related with more vertical M&A as CRM and SCM systems can reduce the (internal) coordination cost associated with operating a larger firm, thus enabling the firm to engage in ownership-based coordination.

2 THEORY AND HYPOTHESES

The optimal boundary of the firm is influenced by the tradeoff between internal and external coordination costs (Gurbaxani and Whang 1991). If enterprise systems reduce internal and/or external coordination costs, enterprise systems may affect M&A. When a firm makes an acquisition there are two main types of internal coordination costs: (i) a one-time cost of integrating the acquisition, and (ii) a change in the recurring cost of operating a larger firm. The one-time integration of an acquisition involves rationalization of business processes of the acquirer and the target firm (Sarrazin and West 2011). In this regard, the adoption of enterprise systems to replace legacy systems and custom built applications has increased the level of standardization of applications and reduced the overall cost and complexity of post-merger integrations (Sarrazin and West 2011; Ernst & Young 2011). Thus, enterprise systems can impact the one-time cost of integrating an acquisition as the acquirer can replicate the enterprise system modules/processes in the acquired firm (Du 2015).[1]

However, in addition to the one-time integration cost, another important cost of integrating acquisitions is the recurring cost of operating a larger (i.e., the focal and the acquired) firm. As we discuss below, this recurring cost of operating a larger firm is the internal coordination cost in agency theory (Gurbaxani and Whang 1991; Jensen and Meckling 1976). If enterprise systems reduce internal coordination costs by reducing the recurring cost of operating a larger firm, firm boundary may extend as enterprise systems may encourage firms to achieve economies of scale through M&A. However, if enterprise systems reduce the external coordination cost associated with coordinating with customers and suppliers, enterprise systems may decrease the likelihood of M&A activities since firms can realize the benefits of scale and integration without the commitment and risks associated with acquisitions (Capron and Pistre 2002). The principal

[1] Chung et al. (2003) describe how CEMEX grew into a global organization by acquiring and integrating acquisitions by replicating standardized business processes.

theoretical argument of this paper is that the optimal boundary of the firm is drawn based on the tradeoff between the recurring cost of internal coordination, in the case an acquisition is made; and the recurring cost of external coordination, in case no acquisition is made and the focal firm coordinates with external partners.[2] Thus, if enterprise systems reduce the recurring cost of operating a larger firm, we should see more M&A; and if enterprise systems reduce the recurring cost associated with coordinating activities with external partners, we should see fewer M&A. Using Agency Theory and Transaction Cost Economics we present a coordination cost based framework that is employed to study how ERP, CRM, and SCM systems may affect M&A by influencing the tradeoff between the recurring cost of internal coordination, if an acquisition is made; and the recurring cost of external coordination, if no acquisition is made.

2.1 Agency Theory, Transaction Cost Economics and the Boundary of the Firm

2.1.1 Agency Theory

In Agency Theory, a firm is viewed as a nexus of contracts among self-interested individuals—principal and agents (Gurbaxani and Whang 1991; Alchian and Demsetz 1972; Jensen and Meckling 1976). Under these contracts, the agent has his or her objective—the maximization of the agent's individual utility. Due to the discrepancy between the objectives of agents and the principal, agency cost is incurred by the organization. *Agency cost* includes the cost of monitoring the agents, bonding cost caused by the agent documenting and reporting his/her activities, as well as the residual loss (Gurbaxani and Whang 1991; Jensen 1985). When decision rights are located at the bottom of the hierarchy, information needs to be moved up through the hierarchy to top management. This generates another type of cost due to the transfer of information—*decision information costs*, which includes the cost to relocate information as well as opportunity costs due

[2] This is not to say that the one-time integration cost is less important. It is just that since prior work has emphasized the one-time integration cost (e.g., Tanriverdi and Uysal, 2011), we focus on the recurring cost of integration.

to poor or delayed information (Gurbaxani and Whang 1991). The sum of agency costs and decision information costs is referred to as the internal coordination cost.

2.1.2 Transaction Cost Economics

Transaction cost economics posits that there are costs in using a market as a coordination mechanism and that the firm is an alternative mechanism that facilitates economizing on market transaction costs (Gurbaxani and Whang 1991). The firm's cost for producing or procuring a given component is the sum of the production cost and the transaction cost and the firm's sourcing decision is chosen to minimize this total cost (Clemons et al. 1993; Coase 1937; Williamson 1975). Although market suppliers can provide a component at a lower cost due to economy of scale and specialization, using the market involves significant transaction costs: finding a reliable supplier, contracting, monitoring and enforcing the contract, and coordinating with the supplier for the duration of the contract (Clemons et al. 1993). These transaction costs are also known as external coordination costs.

Clemons and Row (1992) further break transaction costs into *costs of coordination* and *costs of transaction risk*. Costs of coordination include the cost of exchanging information and incorporating that information into decision processes, as well as the cost incurred by the firm due to delays in the communication channel. Transaction risk is the possibility of opportunistic behavior by another party to the relationship, leading to uncertainty surrounding the level and division of the benefits from the increased integration of decisions and operations (Clemons and Row 1992). Information asymmetries, differences in bargaining power, incomplete or unenforceable contracts, relationship-specific investments, low number of potential suppliers and loss of resource control are all factors that can lead to high transaction risk (Clemons et al. 1993). The first column of table 1 summarizes the coordination cost framework that is used to study how ERP, CRM and SCM systems are related with firm boundary and M&A activities of firms.

2.2 Enterprise Systems and M&A Activities

Enterprise systems comprise a centralized database and a modular suite of software applications that enable firms to implement standardized processes across the enterprise. ERP systems are used to manage internal operations, CRM systems are used to organize activities with downstream partners including customers, and SCM systems are used to coordinate activities with upstream suppliers. This section describes ERP, CRM, and SCM systems and then uses the coordination cost framework discussed above to examine how ERP, CRM, and SCM systems may be associated with M&A activities.

2.2.1 ERP Systems

ERP is an enterprise system which manages enterprise data and provides integration across enterprise functions (Gefen and Ragowsky 2005; Stratman 2007). The implementation of ERP systems typically requires that the terminology being used by different departments be standardized so that a common, organization-wide database can be built (Barki and Pinsonneault 2005). This centralized database captures the transactions processed by ERP modules and provides a real-time view of core business processes. ERP systems also standardize and support cross-functional business processes. These cross-functional business process modules enable communication across different departments and facilitate organizational integration. In this way ERP systems enable visibility and coordination wherever there is interdependence among business units (Stratman 2007; Ferdows 2006).

2.2.1.1 ERP Systems and M&A Activities of the Firm

One key impact of ERP systems is reducing internal coordination costs. First, ERP systems reduce *agency costs*. ERP systems support the central functions such as finance and accounting; operational processes such as order processing and fulfillment; and human resource management processes such as compensation, benefits administration, and performance management. These

back-office functions replace part of the human agent work and therefore decrease agency costs. Similarly, by standardizing processes that minimize individual discretion, ERP systems decreases agency costs. Furthermore, ERP systems employ a single database for the entire enterprise. The use of common field definitions across different parts of the organization eases the process of recording and reporting to management, thereby reducing monitoring and bonding costs (Gattiker and Goodhue 2000).

Second, *decision information costs* are also mitigated by ERP systems because of real-time view of core business processes. ERP systems enable business process integration as tightly-coupled ERP modules facilitate coordination among subsystems. This results in direct access to real-time operating information. Thus, top management can access local information and make informed decisions. Therefore, by reducing *agency* and *decision information costs*, ERP systems can reduce internal coordination costs. When internal coordination costs are reduced, firms can achieve economies of scale by making acquisitions, as ERP systems can reduce the internal coordination cost associated with operating a larger firm.[3] Thus ERP systems may encourage firms to make acquisitions, specifically horizontal and conglomerate acquisitions. Column 2 of table 1 summarizes the impact of ERP systems on internal coordination cost.

Moderating Effect of Firm Size. The ability to identify new opportunities and organize effectively to take advantage of these opportunities is an important source of competitive advantage (Hendricks et al. 2007). In this regard, larger firms are likely to have a greater number of pre-existing ties which provide useful information to evaluate the benefits and

[3] Trinity Health, by migrating the hospitals they acquire into their ERP platform, is able to bring their knowledge of drug order sets and patient acuity to the operations of target firms (Tanriverdi and Du 2011b). For instance, when a new regulation regarding clinical practice to ensure patient safety goes into effect, these changes are reflected in the centralized clinical guidelines systems so that all clinics in the hospital system change their medical practice to be compliant with regulation the same day. This illustrates the ability to achieve clinical compliance that is a significant driver of agency cost in the healthcare industry. In this way the ERP systems reduce the internal coordination cost of operating a larger hospital system, and thereby provide the incentive to engage in horizontal M&A.

risks in acquiring these potential targets (Trichterborn et al. 2015). Thus, larger firms have more opportunities to achieve economies of scale by acquiring and integrating target firms. However, larger firms also face greater diseconomies of scale because of their size, as internal coordination cost is higher at larger scale. The benefits of ERP systems from reduction in agency and decision information costs would therefore be greater for larger firms than for smaller firms. Thus, larger firms with ERP systems are likely to derive a greater decrease in internal coordination cost compared to smaller firms with ERP systems, and ERP systems would provide greater incentives to larger firms to engage in M&A. Accordingly, we expect firm size to positively moderate the relationship between ERP systems and horizontal and conglomerate acquisitions. Therefore, we hypothesize that,

> Hypothesis 1: Existence of ERP systems will be positively related with horizontal and conglomerate M&A;
>
> Hypothesis 1(a): Firm size will positively moderate the relationship between the existence of ERP systems and horizontal and conglomerate M&A.

2.2.2 CRM Systems

CRM systems provide a standardized method for collecting capturing and sharing customer interactions and offer a combination of transactional and analytical features to manage different customer-facing operations. Typically, CRM systems support three functions: sales and customer service, marketing, and partner relationship management (Oracle Siebel CRM[4]). Sales applications aid activities from lead qualification to deal closure. These systems improve interaction with customers by giving everyone in the organization access to a single source of truth via a customer repository. The marketing component of CRM systems supports marketing

[4] Retrieved from http://www.oracle.com/us/products/applications/siebel/overview/index.html

activities, helps to track campaign effectiveness, and measures return on marketing programs in order to optimize marketing mix and spend. The partner relationship management component of CRM systems enables firms to share information with partners and manage partner relationships. This includes recruiting partners, defining partner goals and strategies, matching and routing leads to partners, joint marketing activities with partners, and partner performance analysis and rewards.

2.2.2.1. CRM Systems and M&A Activities of the Firm

CRM systems can decrease both the internal and external coordination costs of the focal firm. CRM systems can reduce internal coordination cost due to lower agency and decision information costs. *Agency costs* are lowered by decreasing monitoring costs. CRM systems make it easier for management to gain information about the performance of sales and customer service employees. CRM systems enable sales managers to schedule, monitor, and track sales activities. Similarly, CRM systems enable firms to supervise and monitor customer service activities. CRM systems also reduce agency cost by enabling firms to evaluate the effectiveness of different marketing programs so that marketing dollars can be allocated more efficiently. For example, CRM systems help track campaign effectiveness, and measure return on marketing programs. This enables firms to optimize marketing mix and spend, and helps to make more well-informed decisions.

CRM systems can also reduce *decision information costs*. CRM systems deliver critical information to everyone involved in the sales process, including field sales, sales management, and channel partners to ensure that all users have current and consistent information they need to make informed decisions. CRM systems also decrease the opportunity cost caused by poor information. The information provided by CRM systems along with real-time reporting and historical analytics enables management to make better decisions. In this way, by reducing agency and decision information costs, CRM systems reduce the internal coordination costs

associated with coordinating downstream activities. If CRM systems reduce the cost of coordinating downstream activities, firms can achieve economies of scale by conducting downstream activities on a larger scale. When firms can coordinate downstream activities on a larger scale, they have the incentive to make downstream acquisitions.[5]

Besides internal coordination costs, CRM systems can also reduce external coordination costs by decreasing cost of coordination with customers and transaction risk. The *cost of coordination* with customers is decreased through the adoption of CRM systems. The process of ordering and order-tracking is automated by CRM systems. CRM systems enable firms to create, validate, and manage quotes and orders. They support pricing, availability checking, and credit and payment verification to ensure that orders are complete, valid, and accurate, before they are delivered to the customer. CRM systems also provide a single source of truth that eases communication between sales employees and customers; thus fewer mistakes are made, and requests are delivered in a timely manner.

Furthermore, CRM systems decrease *transaction risk* by reducing information asymmetry. First, sales employees are better informed with CRM systems to guide their decision making. CRM systems give sales employees the information they need to take action and conduct intelligent interactions with customers. Second, with CRM systems, channel partners' information also becomes more transparent. The partner relationship management component provides evaluation on sales, service, and marketing activities conducted with partners in order to assess partner performance. Thus, partners' performance becomes more transparent to the focal firm. Consequently, CRM systems reduce the cost of coordination and transaction risk with

[5] EMC acquired Documentum and moved all of Documentum's products onto EMC's CRM platform (Tanriverdi and Du 2011a). Having Documentum's products incorporated in the EMC's CRM system allowed the salesforce (that now included the salesforce of Documentum) to include Documentum products along with EMC's products in customer proposals. The CRM system thus reduced the agency and decision information cost associated with the salesforce of EMC and Documentum. The CRM system thus lowered EMC's cost of operating a larger firm with a more diverse product portfolio, and a larger salesforce and customer base, thereby justifying the acquisition of Documentum.

external customers/partners. In this way, CRM systems reduce the external coordination cost of coordinating with downstream partners and reduce the need to make risky downstream acquisitions. Column 3 of table 1 summarizes the impact of CRM systems on internal and external coordination costs.

From the above discussion, we can see that CRM systems can influence the vertical boundary of the focal firm in both directions; if the impact of decreasing internal coordination cost is higher, CRM systems may be related with more vertical M&A as ownership-based governance is more efficient. However, if the impact of decreasing external coordination cost is stronger, CRM systems may be associated with a smaller vertical firm i.e., fewer vertical M&A activities as information-based governance is more efficient overall. Given that acquisitions are risky (Capron and Pistre 2002), we hypothesize that CRM systems are associated with fewer vertical M&A activities.

Moderating Effect of Industry Dynamism. Environmental uncertainty is recognized as an important influence on firm actions in the management and IS literatures (Keats and Hitt 1988). When the focal firm's industry is dynamic, industry sales are uncertain and unpredictable. Strategies and tactics such as long-term contracts and vertical integration are used to create a more predictable environment (Dess and Beard 1984). Thus, focal firm industry dynamism may moderate the relationship between CRM systems and vertical M&A. First of all, dynamism increases external coordination cost by increasing: (a) cost of coordination with customers, and (b) transaction risk. A focal industry being highly dynamic implies possible frequent price fluctuations, regular turnover of customers, and the necessity for timely and more communication between the focal firm and its customers. All these scenarios lead to a higher cost of coordination with customers. The focal industry being more dynamic also implies a higher transaction risk. Under unpredictable and volatile demand, information asymmetry between the focal firm and its

customers is higher. Also, long-term contracts are harder to form as a result of the unpredictability of the future. The problem of incomplete or unenforceable contracts also deteriorates since it is difficult for the contract to unambiguously cover all contingencies in a dynamic environment. Thus, dynamism increases the external coordination cost of the focal firm by increasing costs of coordination and transaction risk. Dynamism also increases internal coordination cost by increasing agency cost. Agency Theory (e.g., Jensen and Meckling 1976) suggests that it is more difficult for the principal to monitor and evaluate individuals' decisions in uncertain environments. When demand is dynamic, it is harder for the sales managers to decide if the poor performance is due to volatility of demand or due to lack of salesperson's efforts.

Firms may strive to manage the dynamism-induced increase in internal and external coordination cost by using the internal coordination capabilities of CRM systems. That is, firms may reduce the cost of coordinating with downstream partners by acquiring and integrating them, rather than dealing with the higher uncertainty of coordinating with an external partner (Salinger 1988; Hart et al. 1990; Ordover et al. 1990). In other words, though dynamism may increase internal coordination costs, it may increase internal coordination costs less than the increase in external coordination costs. That is, since CRM systems can reduce the internal coordination cost of coordinating downstream activities, the focal firm may deal with industry dynamism by acquiring and integrating downstream partners; and industry dynamism may weaken any negative relationship between CRM systems and vertical M&A. Therefore, we propose:

> Hypothesis 2: Existence of CRM systems will be negatively related with vertical M&A;
>
> Hypothesis 2(a): If CRM systems are negatively related with vertical M&A, focal firm industry dynamism will weaken this relationship.

2.2.3 SCM Systems

SCM systems support collection and sharing of information involved in the procurement of inputs; managing supplier interactions; and handling the logistics of storage and movements of raw materials, intermediate and finished goods. SCM systems typically support processes including demand planning and forecasting, supplier management, supply chain logistics, and inventory and returns management.

2.2.3.1 SCM Systems and M&A Activities of the Firm

SCM systems can reduce internal coordination costs in the supply chain (Lee et al. 1997). SCM systems allow firms to share demand, production planning, and inventory information in real time so that the focal firm can monitor raw materials procurement, production, and delivery of inputs (output) to its facilities (customers). Similarly, the movement of entities through a supply chain is expected to follow a planned sequence of steps. In this regard, SCM systems provide individualized trace data as entities move through the supply chain (Shu and Barton 2012). Thus, the increased visibility to events and entities in the supply chain reduces *agency cost* for the focal firm. SCM systems also reduce *decision information costs* in the supply chain. When a supply chain event doesn't occur on schedule the disruption can affect the supply chain process in many ways. By sharing scheduled and actual demand, production, and delivery information in real time, SCM systems enable firms to adapt to disruptions. For example, by monitoring process timeliness and sequence correctness, SCM systems help managers decide if and when to intervene (Shu and Barton 2012). Thus, by reducing agency and decision information costs, SCM systems reduce the internal coordination cost associated with an integrated supply chain. If SCM systems reduce the cost of operating an integrated supply chain, firms can achieve economies of scale by engaging in

vertical acquisitions. Thus, by reducing the internal coordination cost of operating a vertically integrated supply chain, SCM systems provide the incentive for vertical acquisitions.[6]

SCM systems also provide firms the ability to streamline information exchange with their suppliers and reduce external coordination costs (Vollman et al. 2005). SCM systems enable firms to transact electronically with suppliers and reduce the *costs of coordination* through lower cost of exchanging information, fewer delays, and less miscommunication. For instance, using SCM systems, retailers can provide real time point of sale data (POS) to suppliers so that suppliers can schedule production and plan inventory replenishment that reduces warehousing and inventory costs in the supply chain. Such inter-organizational coordination allows firms to integrate their business processes with their suppliers' business processes and achieve quasi-integration (Zaheer and Venkatraman 1994).

SCM systems also lower *transaction risks* by enabling firms to define and track commitments and ensure compliance. SCM systems can reduce transaction risks by continuously monitoring compliance with order terms such as on-time deliveries and product performance against contractual commitments, and by notifying interested parties when a compliance issue arises. Also, as SCM systems can monitor real-time business process events, they can sense exception conditions and respond with alerts and notifications to appropriate users and partners. For instance, firms in high technology industries can monitor deliveries by their authorized distributors to ensure regulatory compliance with export controls for their products. Column 4 of table 1 summarizes the impact of SCM systems on internal and external coordination costs.

In sum, SCM systems are important influences on vertical M&A due to their impact on internal and external coordination costs. On one hand, the internal coordination capabilities

[6] Office Depot bought OfficeMax. Office Depot's ability to derive value from this acquisition will depend on the Office Depot's SCM system's ability to rationalize and integrate OfficeMax's distribution centers in the Office Depot supply chain. (Brown, Abram. (2013, February 19). "*Office Depot-OfficeMax Merger Would Probably Avoid Antitrust Issues"*. Retrieved from Forbes.com.)

provided by SCM systems can reduce agency and decision information costs associated with operating a larger and more vertically integrated supply chain. This ability to coordinate a larger and more integrated supply chain motivates firms to achieve economies of scale through vertical acquisitions. However, while the efficiencies of internal coordination from SCM systems can increase the motivations to engage in vertical M&A, M&A are risky (Capron and Pistre 2002). Since SCM systems can also reduce external coordination cost of coordinating with suppliers, they offer a means to realize the potential benefits of scale and integration without the cost and risk associated with vertical M&A. Therefore, by lowering costs of external coordination, SCM systems may lead firms to coordinate their supply chain activities through information-based governance rather than through vertical M&A and asset ownership.

Moderating Effect of Supplier Industry Concentration. Supplier concentration may moderate the relationship between SCM systems and vertical M&A by increasing external coordination costs. As an important source of external coordination cost, transaction risk increases with the lack of bargaining power (Clemons et al. 1993). When the number of potential suppliers for a product is low, the supplier may attempt to exploit the focal firm's dependence on it (Clemons et al. 1993). For example, the supplier may try to charge higher price which leads to a higher renegotiating cost. Also, the focal firm might have to invest in relationship-specific investments due to the lack of alternative sources of supply, which further deteriorates the holdup problem. In this regard, since SCM systems can reduce internal coordination costs associated with operating a larger and more vertically integrated supply chain, as supplier concentration increases, the focal firm may acquire suppliers to engender a more predictable environment. In other words,

as supplier concentration increases, SCM systems are likely to be associated with an increase in vertical M&A. Therefore, we propose the following hypotheses,

Hypothesis 3: Existence of SCM systems will be negatively related with vertical M&A;

Hypothesis 3(a): If SCM systems are negatively related with vertical M&A, supplier industry concentration will weaken this relationship.

3 METHODOLOGY

3.1 Data and Sample

We study how a focal firm's (i.e., potential acquirer's) ERP, CRM and SCM systems affect the number of M&A the firm makes. Our sample comprises North American Fortune 1000 firms from 2009 to 2014. The unit of analysis is a firm-year i.e., the type and number of M&A a focal firm makes in a given year. This study has four major data sources. First, explanatory variables including ERP, CRM and SCM system implementation information are obtained from the Harte-Hanks CI database. Second, the M&A data is collected from the SDC Platinum Mergers and Acquisitions database. Third, the industry relatedness data and industry level control variables including industry concentration are drawn from the Bureau of Economic Analysis (BEA) and the Census Bureau of United States. Finally, focal firm industry dynamism and firm level control variables are calculated from the COMPUSTAT database.

From the SDC Platinum Mergers and Acquisitions database, we obtain all the mergers and acquisitions completed between 2009 and 2014 with the acquirer being in North America[7]. The SDC Platinum Mergers & Acquisitions data and the ERP, CRM, and SCM system information from Harte-Hanks are merged based on the exchange and ticker information from Harte-Hanks

[7] We removed all the deals that were listed as: (a) repurchases, self-tender offer, recapitalization, buyback, exchange offer, spinoff, or divestiture (this is consistent with Shenoy 2012) and (b) deals that have either the acquirer or target being in the public sector (2-digit North American Industry Classification system being 92). We removed all the deals involving the public sector because in the BEA input-output table the mapping between IO and the NAICS public sector is not available.

and the SDC database. M&A transactions are categorized into horizontal, vertical, and conglomerate M&A deals based on the Vertical Relatedness Index (VRI) (Fan and Goyal 2006) and the industries that the acquirer and target are in. VRI, as defined immediately below, is calculated from BEA Use Tables 2007 (before redefinition/producer value) with 388 industries. Finally, the data is aggregated to the firm-year level with the dependent variables being the number of horizontal, pure vertical, and conglomerate M&A that the focal firm made each year. This process results in a final sample of 707 unique firms across six years from 2009-2014 totaling 3,208 firm-year observations. These firms come from 180 Input-Output (IO) industries[8]. From year 2009 to 2014, they made 1,973 M&A deals in total.

3.2 Variables and Measurements

3.2.1 Dependent Variables

The dependent variables in this study include the number of horizontal, pure vertical, and conglomerate M&A in each firm-year. The assessment of whether an M&A deal is a horizontal, pure vertical, or conglomerate M&A is based on the primary industries that the acquirer and target firms are in, as well as the amount of input/output flow between these two industries. Using the Input-Output Use table from BEA we construct a continuous Vertical Relatedness Index (VRI) for every industry pair. For each industry pair i and j, the VRI is defined as the maximum of the dollar value of input from industry i (j) in order to produce one dollar of industry j (i)'s output. Based on the VRI and the industries that acquirer and target firms are in, the dependent variables are defined as follows (Fan and Goyal 2006):

Table 2: Definitions of the Dependent Variables

Dependent Variables	Definitions

[8] We use the BEA defined input-output industries as our definition of industries. There were 389 industries in total in 2007.

Horizontal M&A	A horizontal M&A is defined as a merger or acquisition between firms belonging to the same IO industry.
Pure vertical M&A	A pure vertical M&A refers to a merger or acquisition between firms belonging to different IO industries, and having VRI higher than 1%[9].
Conglomerate M&A	A conglomerate M&A is a merger or acquisition between firms in different IO industries that have low vertical relatedness (VRI lower than 1%).

The choice of these three dependent variables has many advantages. First, horizontal, pure vertical, and conglomerate M&A add up to the total number of M&A, so there is no double counting of M&A. Also, since ERP systems influence internal coordination costs, they may affect horizontal and conglomerate M&A; and since CRM and SCM systems influence internal and external coordination costs in vertical coordination, they may affect pure vertical M&A. In this way the analysis provides a comprehensive picture about the impact of enterprise systems on (horizontal, vertical, and conglomerate) M&A. [10]

3.2.2 Independent Variables

The key independent variables are ERP, CRM, and SCM systems in the firm. The information about these systems exists at the site level. We aggregated the site level availability of the systems to the firm level by weighting by the number of employees at the site.

ERP System. The ERP system variable was constructed using Principal Component Analysis (PCA) on three modules: accounting/finance (ACC), human resources (HR) and workflow (WORKFLOW) software. Harte-Hanks database provides information on ACC, HR and WORKFLOW module implementation in each site (1 if implemented, 0 otherwise). ACC, HR and WORKFLOW module implementation at the site was weighted using the number of

[9] In the analysis, we also present results with 0% and 5% cutoffs.

[10] Vertical M&A are M&A where VRI is higher than 1% and the acquirer and the target are not necessarily from different IO industries. The results for vertical M&A are quite similar to the results for pure vertical M&A.

employees to generate firm-level module implementation. Then we conducted PCA on the firm-level ACC, HR WORKFLOW module implementations. From the result of the PCA, we take the first principal component (it has an eigenvalue of 2.3 and is the only component with an eigenvalue higher than 1) as our measure of ERP system.

CRM and SCM System. Harte-Hanks collected information on CRM and SCM system module implementation at the site level (1 if implemented, 0 otherwise). We aggregated the site-level CRM and SCM system information to the firm level by weighting them using the number of employees at the site.

The second key independent variable is the size of the focal firm. This is measured as the standardized total number of employees in the firm (standardized to mean 0 and standard deviation of 1). The third independent variable is dynamism of the focal firm industry. Dynamism refers to the volatility and unpredictability of the changes that a business unit has to deal with (Keats and Hitt 1988). Following Keats and Hitt (1988), dynamism is measured as the volatility of industry sales. Sales volatility is measured using a two-step procedure. First, the natural logarithm of the total sales of IO industries is regressed against an index variable of years, over a period of five years. Second, the antilog of the standard error of the regression coefficient is used as the measure for sales volatility. The intuition behind this measure is that the standard error of the regression coefficient reflects the unpredictability of the sales growth rate. The fourth key independent variable is supplier industry concentration. Supplier industries are recognized by BEA Use Tables 2007—any industry that has goods inflow into the focal firm industry. Since one focal firm can have multiple supplier industries, supplier industry concentration is a weighted average of the industry concentrations measured by

Herfindahl-Hirschman Index (HHI) of all the supplier industries as recognized above. For each IO industry, HHI is not directly available from US Census. We calculated IO industry HHI by following these two steps: (1) use the sales (or receipt, revenue) for the largest 4, 8, 20, 50 and all firms for each industry defined at the 6-digit NAICS level to construct the HHI for each NAICS industry; (2) calculate HHI of IO industries as a weighted average of NAICS HHI (the weight being the square of sales share of each NAICS industry in the IO industry).

3.2.3 Control Variables

Existing research on M&A identifies a number of variables that influence M&A. At the firm level, we control for the level of vertical integration and diversification. A more vertically integrated firm may have greater propensity to engage in vertical M&A. We also control for the level of related and unrelated diversification (Fan and Lang 2000). Firms with high level of related diversification may engage in more horizontal M&A and firms with high level of unrelated diversification may engage in more conglomerate M&A.

We also control for the size and financial condition of the focal firm. Multiple studies report the effect of the size of acquirer, where large firms are known to make more acquisitions. Thus, we use standardized total number of employees to control for the size of the focal firm (Hannan and Freeman 1984). Acquirer performance is also an important factor in M&A as more successful firms may engage in more M&A. Acquirer firm performance is measured as net income divided by total asset of the acquirer from the previous year. Organizational slack has also been linked to M&A (Lang et al. 1991) as firms with more slack may engage in more M&A. Acquirer slack is calculated as the focal firm's cash in hand in the previous year, divided by total asset (Lang et al. 1991). We also control for other information technology at the firm, including number of PCs and

servers per employee and the proportion of IT employees in total employees. These variables measure the level of IT investment and IT capabilities in the focal firm.

At the industry level, we control for the concentration and munificence of the focal industry. Industry concentration controls for the level of competition in the industry that may influence M&A. Industry concentration is measured using the Herfindahl-Hirschman Index (HHI) from 2007 Economic Census. Munificence refers to the opportunities for growth in an industry that may also influence M&A (Dess and Beard 1984). Following Keats and Hitt (1988), we use the growth in industry sales as a measure of munificence. Industry conditions such as the total volume of M&A activities in the industry are also known to affect acquirers' behavior (Bergh and Lawless 1998). Thus we control for total number of M&A in the acquirer industry in the current year (aggregated from SDC data).

3.3 Empirical Strategy

The baseline specification is a negative binomial regression. In order to mitigate potential endogeneity, we also employ instrumental variables to address the possibility of selection and omitted variable bias. Finally, to better support a causal relationship between enterprise information systems and M&A, we also explore the within-firm variation in the data. We conduct a Coarsened Exact Matching (CEM) procedure (Iacus et al. 2011a; Iacus et al. 2011b; Ho et al. 2007) to identify our treated and control samples (firms that implemented one of the three enterprise information systems are recognized as the treated group; those who did not implement any system are considered the control group). Using this matched sample, we employed a difference-in-difference (DD) analysis to explore how the implementation of a system changes a firm's decision on M&A.

3.3.1 Baseline Model: Negative Binomial Regression

Our baseline empirical strategy employs a pooled negative binomial regression with the M&A counts per firm-year as the dependent variables. As an extension of the Poisson regression, a negative binomial regression is used to estimate models of counts of an event when the event has extra-Poisson variation in the form of over-dispersion. A formal test of the null hypothesis of equi-dispersion rejects the null hypothesis of equi-dispersion (Cameron and Trivedi 2010). Therefore, a negative binomial model is more appropriate than a Poisson regression. We estimate the negative binomial model with robust standard errors, clustered by firm with year fixed effects.

3.3.2 Instrumental Variables

In order for the estimation in the baseline model to be consistent, we are functioning under the assumption that there is no unobservable in our baseline model that is correlated with both the M&A activities and ERP, CRM and SCM system implementation of the firm. There are scenarios under which this assumption may be violated. For example, a manager who seeks more power may decide to expand the firm and at the same time install an ERP system to get better access to local information. In order to address omitted variable bias and potential simultaneity, we estimate Poisson regression with instrumental variables.

The first set of instrument variables include the total IT employment (IT-EMPLOYMENT) and weighed average annual IT salary (IT-SALARY) in each Metropolitan Statistical Area (MSA) from the previous year (standardized to mean = 0 and standard deviation = 1). This data is collected from the US Bureau of Labor Statistics. It contains the total employment and mean annual wage of computer related occupations in each of the 385-399 MSAs. We weighted the mean annual wage of each IT occupation in each MSA by the IT employment to calculate IT-SALARY for each MSA year.

The second set of instrument variables include ERP, CRM and SCM system implementation in the focal MSA and industry (MSA-IND-ERP, MSA-IND-CRM and MSA-IND-SCM). MSA-IND-ERP is calculated as follows: (1) Harte-Hanks database provides detailed information on 500,000 sites in the US for each year. (2) Each site-year is categorized into a specific MSA (using the zip code of the Harte-Hanks site)-industry (using 2-digit SIC code). (3) The variable MSA-IND-ERP is calculated as the weighted ERP system score of all the sites within that MSA and industry (the weight used here is the number of employees at the site in that year). MSA-IND-CRM and MSA-IND-SCM are constructed the same way.

Valid instrumental variables need to satisfy two conditions: (1) they have to directly influence ERP, CRM and SCM systems, and (2) they have to be exogenous, i.e., that they cannot affect M&A other than through the ERP, CRM, and SCM system variables. First of all, both sets of our instruments directly affect the explanatory variables. MSA IT employment and salary reflect the availability of local IT labor/skill that is relevant to ERP, CRM and SCM system implementation and the cost of using such labor pool. Therefore, these two IVs affect focal firm ERP, CRM, and SCM system implementation through IT labor demand and supply. MSA-IND-ERP, MSA-IND-CRM, MSA-IND-SCM influence the implementation of focal firm's ERP, CRM, SCM system through local peer influence. A focal firm that is in a MSA-industry where ERP, CRM, SCM system implementation is common is more likely to implement ERP, CRM, SCM system as well. For example, if peers have implemented an enterprise system, it would lower a firm's cost of implementing the enterprise system because of the ability to learn from prior implementation by peers. We also conducted formal tests of weak IV. The first stage result shows (see more details in table 6) that these IVs are significantly correlated with the endogenous variables.

Second, these two sets of IVs also meet the exclusion restriction condition. For the first set of IVs IT-EMPLOYMENT and IT-SALARY, we take their one-year lag to remove the possible

scenario that the focal firm inflates the local IT employment and salary due to a large scale M&A. It is quite unlikely for the MSA IT employment and salary from the previous year to directly influence the focal firm's decision on a M&A deal. We argue that given the strategic significance of M&A, it is improbable for a focal firm to forego an otherwise attractive deal simply due to low availability or high cost of IT skills locally, since there are other options to fill the IT skill gap, for example through outsourcing. Similarly, it is also quite improbable for a focal firm to conduct a M&A deal solely because it sees an opportunity to take advantage of an over-supply or low cost of local IT labor. In addition, we also argue that the second set of IVs only affects M&A through the implementation of these systems at the focal firm. If MSA-IND-ERP, MSA-IND-CRM, MSA-IND-SCM directly influences the focal firm's decision on a M&A deal, they are most likely to do so through affecting a firm's performance, cash in hand, or product market competition. First, in our IV models, all these three variables are controlled for. Second, it is unlikely for these IVs to affect the focal firm's M&A through better performance of competitors due to the implementation of ERP, CRM and SCM system in these firms (i.e., focal firm's performance or cash in hand worsens compared to competitors due to the implementation of ERP, CRM and SCM system in the competitors). This is because MSA-IND-ERP, MSA-IND-CRM, MSA-IND-SCM are weighted averages of multiple sites in the focal firm from different MSAs and industries; they do not measure the availability of these systems in one single MSA or industry. Therefore, these IVs capture the local peer influence of the systems without impacting either the focal firm or its competitors' performance.

3.3.3 Coarsened Exact Matching (CEM) and Difference-in-Difference (DD) Analysis

In order to further examine the evidence we find in the negative binomial regressions and the models with IVs, we run three sets of DD analysis (one for each of the systems) to explore within

firm variation in how the implementation of ERP, CRM and SCM systems affects the likelihood of horizontal, pure vertical and conglomerate M&A at that firm.

CEM is a non-parametric data preprocessing (matching/pruning) method that belongs to the "monotonic imbalance bounding" (MIB) class. Compared to the other major class of matching method "equal percent bias reducing" (EPBR), of which propensity score matching (PSM) is an example, MIB method has many desirable statistical properties. First of all, MIB eliminates many of the assumptions required for unbiased estimates of treatment effects in EPBR, and outperforms EPBR in most situations, including those specifically designed to meet the EPBR assumptions (Iacus et al. 2011b). Second, matching methods aim to reduce imbalance in the data in order to reduce model dependence in the estimation of treatment effects and therefore improve causal inference. MIB reduces imbalance on all the moments of the data, while EPBR only reduces the mean imbalance. Furthermore, with CEM researchers can control and set up the imbalance reduction for each of the variables independently. Third, whereas methods such as PSM require determining ex ante the size of the matched control sample, then ensuring balance ex post, CEM does not fix the size of the control units' ex ante but chooses the imbalance level ex ante (Iacus et al. 2011a). Thus, with the CEM method researchers have a better control over the imbalance level of the sample.

We use the ERP system as an example to illustrate how the sample for the ERP DD analysis is constructed. First, we define the treated group as any firm that implemented ERP system but did not implement CRM or SCM system between 2006 and 2014. The control group is defined as any firm that did not implement ERP, CRM and SCM system in the same time frame. Second, we exactly matched the control firms to the treated firms based on industry code and the size of the firm in 2006, specifically, 2-digit SIC code and categories of total number of employees (there are four categories in total: 1-under 500 employees; 2-over 500 and under 1000 employees; 3-over 1000 and under 10,000 employees; 4-over 10,000 employees). This CEM

procedure matched 12 treated to 10 control firms across 9 years from 2006 to 2014 resulting in a total of 158 observations. With an identical process, we constructed the CRM and SCM system CEM samples. The CRM system sample consists of 31 treated firms matched to 22 control firms with a total of 358 observations. The SCM sample is composed of 9 treated and 13 control firms with a total of 161 observations. In each of these samples, the treated and control firms in a matched pair are from the same industry (2-digit SIC) and employment size category.

With the above samples, we run three DD analysis. The DD approach exploits the fact that we observe the number of M&A done by the treated and control firms both before and after the implementation of the specific system. The before-implementation difference in M&A between the treated and control firms serves as a benchmark against which to examine the after-implementation difference. The DD analysis aims to use the within-firm variation before and after the implementation to identify the impact of the ERP, CRM, and SCM system implementation. We also included the moderating effects of the number of employees, dynamism, and supplier industry concentration. The basic model takes the following form:

$$MA_{it} = f\Big(\tau_a TREATED_i + \tau_b AFTER_{it} + \tau_c TREATED_i * AFTER_{it} + \tau_{aa} TREATED_i * MODERATOR_{it} + \tau_{bb} AFTER_{it} * MODERATOR_{it} + \tau_{cc} TREATED_i * AFTER_{it} * MODERATOR_{it} + \theta_x X_{it} + \varepsilon_{it} \Big)$$

Here, the unit of analysis is a firm-year. i indicates the firm while t represents the year from 2006 to 2014. TREATED is the indicator of the firm being in the treated or control group (1 for the treated firms as defined above, 0 otherwise). For treated firms, AFTER is defined as 1 if the observation is from a year after the implementation of the system (the year that the implementation took place is removed). For every control firm, the year of the implementation is recognized to be the same as that of the matched treated firm. The MODERATOR refers to each of the moderators in the baseline model: the number of employees, industry dynamism, and supplier industry concentration. X_{it} is the same list of control variables that we used in the

baseline model. We estimated linear panel model with firm fixed effects and matched pair fixed effects, as well as pooled Poisson models.

Take ERP DD analysis as an example, τ_a and τ_{aa} capture the overall difference in M&A between the treated and control firms before the implementation of ERP. τ_b and τ_{bb} capture the change after the implementation for the control firms. What we are really interested in here is the estimation of τ_c and τ_{cc}. They both reflect the change in the number of M&A for the treated firms after the implementation of the system, adjusted by the time trend of M&A in the control group. τ_c reflects such counterfactual change for smaller firms while τ_{cc} is the net change of M&A for larger firms.

4 RESULTS

In this section, we discuss findings from the baseline negative binomial regression model and Poisson model with IVs and the DD analysis using the three matched samples for ERP, CRM and SCM system implementations respectively.

4.1 Descriptive Statistics

As shown in table 3, on average each firm made approximately 0.19 horizontal, 0.11 pure vertical (if 1% cutoff of VRI is used), and 0.2 conglomerate M&A every year. The correlations between ERP, CRM and SCM systems and M&A suggest that these systems are positively related with the dependent variables.

4.2 Baseline Model: Negative Binomial Regression

Table 4 reports the baseline results. Models 1-7 show the impact of the independent and control variables on different dependent variables. The impact of the control variables is consistent with prior studies. Focal industry M&A is positively related with M&A of the focal firm. Also, better

performing firms tend to engage in more M&A. As expected, more vertically integrated firms tend to expand their vertical boundary further. Also, unrelated diversification is positively related with conglomerate M&A, but negatively correlated with horizontal M&A. These findings increase our confidence in the empirical models.

We discuss the results with the 1% cutoff. However, we also include the results with 0% as well 5% cutoff. The cutoff % used does not affect the number of horizontal M&A. It only affects the number of pure vertical and conglomerate M&A. When a higher cutoff is used, there are fewer pure vertical and more conglomerate M&A compared to when a lower cutoff is used. Due to the fact that it is difficult to discuss the sign and size of the marginal effects (ME) in a negative binomial model with interactions, in table 5 we report the ME of the ERP, CRM and SCM system variables at three levels of the moderators (1 standard deviation (SD) below, at mean, and at 1 SD above the mean of each of the three moderators). We also plot these ME in figure 1. The ME in table 5 and the plots in figure 1 are based on a 1% cutoff.

In table 4, the ERP system and its interaction with the standardized number of employees has no impact on horizontal M&A. However, the ERP system and its interaction with the standardized number of employees show that ERP system has a positive impact on the conglomerate M&A; when a 1% cutoff is used, this positive impact is significant (at 0.1 level) for smaller firms (model 5); under 5% cutoff this positive impact is significant (at 0.05 level) for smaller firms (model 7); when a 0% cutoff is used, the positive impact of ERP system is significant (at 0.05 level) for larger firms (model 3). In table 5, the ME indicates that when all the other variables are at their mean level, if the ERP system increases by 1 SD, which is 1.57, conglomerate M&A increases by 0.04 (model 3 of table 5: 0.024*1.57 = 0.04), which is approximately a 20% increase in the mean number of conglomerate M&A (0.04/0.2 = 20%). Although the ME is still positive when the firm is small (standardized number of employees at 1 SD below the mean, model 3), the positive impact of ERP system is much smaller (conglomerate

M&A increase by 0.004*1.57 = 0.006 when ERP system increases by 1 SD). Similarly, the positive impact of ERP system is almost 3 times larger when the standardized number of employees is at 1 SD above the mean than at the mean. This moderating effect can be seen clearly in figure 1. Panel 2 indicates that ERP systems in vast majority of the cases has a positive impact on the number of conglomerate M&A and this positive impact increases with the size of the focal firm. This analysis supports hypothesis 1 and 1a.

In table 4, CRM system and its interaction with dynamism have a significant impact (at 0.01 level) on the number of pure vertical M&A across different cutoffs of pure vertical M&A (model 2, 4, and 6 of table 4). Model 2, 4 and 6 show that the direction and size of the impact of CRM system on pure vertical M&A depends on the dynamism level of the focal industry. When dynamism is low at 1 SD below the mean, if CRM system increases by 1 SD (0.22), pure vertical M&A decreases by 0.023 (-0.104*0.22, model 5 in table 5). This is approximately a 21% decrease (0.023/0.107) in the number of pure vertical M&A. However, if dynamism is at the mean, the number of pure vertical M&A increases by 0.009 (0.042*0.22) with 1 SD increase in CRM system, which translates to an 8% increase in the number pure vertical M&A. This positive effect becomes even higher when dynamism is high at 1 SD above the mean (0.236*0.22=0.052); this equals to an increase of over 48% compared to the mean level of pure vertical M&A in our sample (0.052/0.107). This moderating effect of dynamism on CRM can be seen in panel 3 of figure 1. This is analysis supports hypothesis 2 and 2a.

In table 4, SCM systems have a negative impact on pure vertical M&A (model 2, 4, and 6 of table 4). When the supplier industry concentration is relatively low, if 0% or 5% cutoff is used, the negative impact of SCM system is significant at 0.01 level; under 1% cutoff, SCM system is negative and significant at 0.05 level. This negative relationship amplifies (weakens) when the focal firm is facing supplier industries with lower (higher) level of concentration. This moderating effect is significant at 0.05 level (0% and 5% cutoff, model 2 and 6) and 0.1 level

(1% cutoff, model 4). When SCM system increases by 1 SD (0.23), the number of pure vertical M&A decreases by 0.03, 0.02 and 0.009 (-0.129*0.23, -0.091*0.23, and -0.037*0.23, model 8 table 5) when supplier industry concentration is at 1 SD below, at mean, and 1 SD above the mean. These numbers translate to a 27%, 18% and 8% decrease in the number of pure vertical M&A. Panel 4 of figure 1 presents the same result graphically. This analysis supports hypothesis 3 and 3a.

4.3 Poisson Regression with Instrumental Variables

In order to address the potential omitted variable bias and simultaneity problem, we estimated Poisson models with instrumental variables. Besides the 5 IVs that we described above (IT-EMPLOYMENT, IT-SALARY, MSA-IND-ERP, MSA-IND-CRM, and MSA-IND-SCM), we also interact the 5 IVs with the 3 moderators as the IVs for the interaction terms. For the estimation of the Poisson regression with instrumental variables, we used a control function (CF) approach. The CF estimator involves two steps. In the first step, a reduced form for the endogenous explanatory variables is estimated. In the second step, the estimated residual from the first step as well as the endogenous explanatory variables and other exogenous controls are included in a Poisson quasi-maximum likelihood estimation (Wooldridge 2010).

Table 6 shows the first-stage OLS results for our Poisson model with IVs. Model 1-3 has focal firm's ERP, CRM and SCM system as the dependent variables respectively[11]. The signs of the IVs are as expected. MSA-IND-ERP is positively related with the implementation of all the enterprise systems. In general, MSA-IND-SCM is negatively related with ERP and CRM systems at the focal firm but positively related with the SCM system implementation. MSA IT employment is generally negatively related with the focal firm's ERP, CRM, SCM system

[11] In table 6 we only reported the first stage result when both sets of IVs are included. We also run separate models with only one set of IV. The result is very much consistent with what we see in table 6. This reflects that our two sets of IVs catch different variations in endogenous explanatory variables.

implementation (especially so for larger firms). This reflects the local competition for IT labor (IT-EMPLOYMENT reflects local demand for IT labor). MSA average IT salary is positively related with the implementation of CRM and SCM systems, especially for larger firms. This reflects the supply of IT labor. The F-statistics on the excluded instruments in the first-stage regression range from 55 to 101, and in all cases are significant at 1% level. We also calculated the Stock and Yogo (2005) critical threshold for weak instruments. Since the Stock and Yogo (2005) test only report critical values with 1, 2 or 3 endogenous regressors and between 3 and 30 instruments, we were only able to estimate the critical values for the model without interactions. The minimum eigenvalue statistic is 190.8, which is much higher than the critical value of 9.53. Therefore, we reject the null hypothesis that the IVs are weak.

Table 7 presents the second-stage results. The results are generally consistent with the baseline models and the hypotheses. Model 1 indicates that ERP system has a positive impact on horizontal M&A, when the focal firm is large (at 0.05 level). Likewise, model 3 indicates that ERP system has a positive impact on conglomerate M&A, when the firm is larger (at 0.01 level). Also, CRM system has a negative impact (at 0.01 level) on pure vertical M&A when dynamism is low (model 2, 4 and 6). With higher dynamism, this negative impact gets smaller and eventually turns into positive. The result of SCM system is also consistent with the baseline model. Model 2 and 6 suggest that SCM system is negatively related with pure vertical M&A when the supplier industry is less concentrated (at 0.1 significance level in model 2); but when the supplier industry concentration increases, the impact eventually becomes positive. This moderating effect is significant in model 2 (at 0.1 level) and model 6 (at 0.01 level).

4.4 CEM and DD Analysis

Using the CEM sample discussed in the empirical strategy section above, we estimated 3 sets of DD models for the impact of ERP, CRM and SCM system implementation on M&A. This

analysis supplements our baseline model in that it examines the within-firm variation in the data. In the DD analysis the M&A activity changes in firms that adopted ERP (or CRM, SCM) system are adjusted by the trend of M&A of similar control firms. Using the CEM sample, we estimated the following models for ERP, CRM and SCM systems samples respectively: (1) linear panel model with firm fixed effects; (2) linear panel model with matched pair fixed effects; (3) pooled Poisson model with robust SE clustered over firms. Tables 8 and 9 report results of DD analysis using the ERP, CRM and SCM system samples. Pooled Poisson model suggests that after implementing ERP system, the treated firm increases the number of horizontal and conglomerate M&A it engages in, even after adjusted by the time trend of M&A in the control firms, especially conglomerate M&A (table 8, model 5 and 6). This positive impact is particularly significant for larger firms. Model 1-3 of table 9 report the DD results for CRM system and model 4-6 for the SCM system. For the CRM system, both linear panel and pooled Poisson models indicate that even after adjusted by the time trend of M&A in the control group, the treated firm conducted a significantly smaller (larger) number of pure vertical M&A deals after implementing CRM system when it faces stable (unstable) demand (model 1-3). The linear panel model with firm fixed effects for the SCM system shows that after implementing SCM system, the treated firm conducted fewer pure vertical M&A compared to the control firms, when the supplier industry concentration was high (model 4 of table 9). The sign of the impact of SCM system is consistent with our baseline model (a negative impact); but the moderating effect of supplier industry concentration shows either non-significance (model 5 and 6) or a negative impact (model 4). We believe that this is due to the small sample size and the skewed distribution of supplier industry concentration in the DD analysis. Our SCM DD analysis has 161 firm-year observations (compared to 3,208 in the baseline model) with firms that face high supplier industry concentration being more sparse than the baseline sample. Therefore, it is not surprising that the moderating effect is not significant or has a negative sign here.

4.5 Other Robustness Checks

In addition to the above analysis, we also conducted other robustness checks.[12] To exhaust all the industry influence in our baseline model, we also repeated the analysis with a full list of industry dummies (IO industries). The results show no difference qualitatively from the baseline models. Since enterprise system implementation may take multiple years, we run robustness analysis where we examine the 1-year and 2-year lagged effect of ERP, CRM and SCM systems. These models are generally consistent with our baseline model as well.

Measurement error in the explanatory variables can cause inconsistent estimation of the coefficients under the classical errors-in-variables (CEV) assumption[13] (Woodridge 2010). However, we have reason to believe that measure error in independent variables is not a significant issue in this study. First of all, the measures of ERP, CRM and SCM systems are based on information from each site of the firms. An employee directly involved in the management of the site was surveyed about the status of the accounting/finance, human resources management, workflow software, customer/salesforce management, and supply chain management modules. We coded these systems availability to be 1 only when they were specified as "installed". Since specific questions about the presence of each module was asked, it is unlikely for the respondent to under- or over-report the availability of the module. Also, since different respondents were surveyed at the sites (i.e., each site had a different respondent) it is unlikely for the measurement errors of the sites (if any) within one firm to be correlated. Second, in order to improve the robustness of our measures of ERP, CRM and SCM system, we also used revenue of the site as an alternative weight. In addition, to focus on the ERP, CRM, and SCM system availability at the core sites of the focal firm, we calculated the same variables with only

[12] These results are not included in the paper to conserve space, but are available upon request from the authors.

[13] The measurement error is uncorrelated with the unobserved explanatory variable with measurement error.

the large sites (more than 100 employees) or top sites (the largest sites whose number of employee comprises over 80% of total employees in the firm). The results are highly consistent with our baseline models. Finally, we argue that if respondents systematically overreport the availability of the different modules at their site, we should find a consistent relationship between ERP, CRM, and SCM systems and horizontal, pure vertical, and conglomerate M&A. However, that is not what we find. We find that ERP systems are generally positively related with horizontal and conglomerate M&A; and SCM and CRM systems are negatively related with pure vertical M&A, unless supplier industry is concentrated or industry dynamism is high. This may suggest that respondents are not systematically overreporting the implementation of enterprise system modules.

In addition, we also checked the possible bias that the mapping from IO to NAICS industries might cause. In this paper, the definition of industry (389 IO industries) is from BEA Input-Output Accounts Data from 2007. Each IO industry has a one to one or one to many relationship with 3 to 5-digit 2007 NAICS codes. This mapping is more granular for manufacturing industries. Out of the 389 IO industries, 238 of them are in the manufacturing industry. In order to assess if the granularity of the mapping changes our results, we run separate analysis for manufacturing and non-manufacturing industries. The result shows that the positive impact of ERP system on horizontal M&A is only present for non-manufacturing industries. The CRM system results in both manufacturing and non-manufacturing industries are consistent with our baseline models. Also, the impact of SCM system on pure vertical M&A is significant in both the manufacturing and non-manufacturing industries. But the positive moderating effect of supplier industry concentration is only significant in the manufacturing industry. This is expected as consistent and predictable supplier relationship management is more important in the manufacturing context.

Further, this paper takes an efficiency perspective in examining the impact of enterprise systems on M&A i.e., the rationale for the impact of enterprise system on M&A is based on the impact of enterprise systems on internal and external coordination costs. There are other motivations for M&A besides efficiency, for example, anti-competitive motivation for both horizontal and non-horizontal M&A (Shenoy 2012). In order to tease out anti-competitive motivation for M&A, we removed M&A in our sample that possibly had an anti-competitive motivation. Based on the criteria provided in the horizontal and non-horizontal merger guidelines by the Federal Trade Commission (FTC), we labelled a non-horizontal M&A as anti-competitive and removed it for the robustness check if: (1) the overall concentration of target market was over 1800 HHI; (2) the acquirer already operated in the industry of the target as a minor sector; (3) the target firm was listed with a Forbes Sales 500 Rank when acquired. Using a similar approach, we followed the horizontal merger guidelines and removed horizontal M&A that possibly had an anti-competitive motivation. In addition, we also removed deals that were over 50% stock financed to tease out the possibility that the acquiring firm conducted an M&A deal to take advantage of the over-evaluation of their stock. The results show that when the anti-competitive and stock financed deals were removed, the economic significance of CRM and SCM systems on pure vertical M&A became stronger; and the economic significance of ERP system on horizontal and conglomerate M&A did not change.

Finally, to tease out the possibility that target firm's ERP, CRM and SCM systems lead to the results that we see in the baseline model, we conducted a case-control design; we constructed a sample that matched actual M&A (cases) with a set of synthetic counterfactual M&A deals (controls)—combinations of firms that could have merged but did not, using CEM (Rogan and Sorenson 2014.). By setting the unit of analysis at the transaction level, we were able to include both acquirer and target firm's enterprise information systems and other factors that affect the likelihood of a M&A (Palepu 1986; Younge et al. 2015). The results on the acquirer side

enterprise systems are consistent with our baseline model; the results of target's side enterprise systems show that the target firm's ERP, CRM and SCM systems do not have significant impact on horizontal, pure vertical and conglomerate M&A. This may be due the fact that the acquirers in our sample are Fortune 1000 firms that are typically much larger than the targets and probably have superior IT capabilities than the targets; thus the acquirers replace the target's IT systems (Tanriverdi and Uysal 2015) with their own IT system in the M&A integration process.

5 CONCLUSION AND DISCUSSION

How does IT affect firm boundary has been an enduring topic of interest in the IS field. This literature suggests that IT is associated with less vertical integration and more diversification (e.g., Brynjolfsson et al. 1994; Dewan and Min 1998; Hitt 1999). There is also literature that suggests that IT enables firms to generate economic value from acquisitions by helping to integrate acquisitions (Tanriverdi and Uysal 2011; Tafti 2011). In contrast to the aforementioned literatures, this research examines how enterprise systems—ERP, CRM, and SCM systems are related to firm boundary through M&A. This paper makes important theoretical and empirical contributions.

The primary theoretical contribution of this study is to make the argument that ERP, CRM, and SCM system, by reducing agency cost, encourage firms to achieve economies of scale through horizontal, vertical and conglomerate acquisitions, as enterprise systems can reduce the internal coordination cost associated with operating a larger firm; and that CRM and SCM systems, by reducing the transaction cost of coordinating activities with customers and suppliers, decrease the propensity to make vertical acquisitions. Thus, this paper links enterprise systems, Agency Theory and Transaction Cost Economics to

M&A; and examines how ERP, CRM, and SCM, by reducing internal and external coordination costs are related to horizontal, vertical and conglomerate M&A.

The empirical contribution of this paper is that it reveals that ERP systems have a positive relationship with horizontal and conglomerate M&A as ERP systems can reduce internal coordination costs associated with operating a larger firm. This finding is consistent with prior work that suggests that IT investments are positively related with diversification (Dewan and Min 1998; Hitt 1999). The empirical analysis also indicates that this effect is stronger if the potential acquirer is larger. A larger acquirer has more opportunities to achieve economies of scale by making a horizontal or conglomerate acquisition. However, a larger acquirer also suffers from higher diseconomies of scale; thus, a larger acquirer can derive greater benefits in reduction of internal coordination costs from ERP systems, which increases a larger firm's incentive to make horizontal and conglomerate acquisitions.

The empirical analysis also reveals that CRM (SCM) systems have a negative relationship with vertical M&A as CRM (SCM) systems can reduce the cost associated with coordinating with customers (suppliers), and thus CRM (SCM) systems allow firms to use information based coordination with customers (suppliers). This finding is consistent with prior research that suggests that IT investments are negatively related with vertical integration (Dewan and Min 1998; Hitt 1999). The analysis, however, also indicates that if the downstream industry is very unpredictable and dynamic that increases external coordination costs, then CRM systems facilitate ownership-based coordination by reducing the internal coordination cost associated with operating an integrated

network of downstream partners. Similarly, if the supplier industry is concentrated i.e., suppliers have market power that increases external coordination costs, then SCM systems are associated with more vertical M&A as SCM systems can reduce the internal coordination cost of operating a more integrated supply chain network; thus enabling ownership-based coordination.

The key implication of the analyses is that as CRM and SCM systems can reduce internal as well as external coordination costs they may be used strategically. When industry dynamism and supplier concentration are low, since CRM and SCM systems can reduce external coordination costs, CRM (SCM) systems are negatively related with vertical M&A as CRM (SCM) systems can be used for information-based coordination with customers (suppliers). However, if the downstream sales are very unpredictable and external coordination costs are high; since CRM systems can be used to reduce the cost of operating a larger network with integrated downstream partners, CRM systems are positively related with vertical M&A as the focal firms can use CRM systems for ownership based coordination. Likewise, if the supplier industry is very concentrated and external coordination costs are high; since SCM systems can reduce the costs of operating a larger and more integrated supply chain network, SCM systems are positively related with vertical M&A as the focal firms can use SCM systems for ownership based coordination. Similarly, the analysis suggests that firms can achieve economies of scale by engaging in horizontal and conglomerate acquisitions. Since ERP systems can reduce the cost of operating a larger firm, ERP system can encourage firms to achieve economies of scale by making horizontal and conglomerate acquisitions. However,

beyond certain size, larger firms suffer from diseconomies of scale. Thus, larger firms can derive greater benefits in reduction in internal coordination cost from ERP systems (compared to smaller firms), and consequently ERP system provide larger firms greater incentive to make horizontal and conglomerate acquisitions.

The findings of this paper have important implications for managers. Many firms have implemented ERP, CRM, and SCM systems to coordinate internal operations as well as coordinate activities with customers and suppliers (Hitt et al. 2002). The findings of this paper suggest that internal and external coordination capabilities provided by ERP, CRM, and SCM systems also have implications for firm scope through M&A. Firms can achieve economies of scale through horizontal and conglomerate M&A. However, there is a cost associated with operating a larger firm. As ERP systems can reduce the internal coordination cost associated with operating a larger firm, a firm with ERP system may make horizontal and conglomerate M&A to achieve scale. Likewise, the analysis suggests that if a firm operates in environments where downstream sales are not very unstable or suppliers are not very concentrated, then the focal firm does not need to make downstream or upstream acquisitions to improve vertical coordination. A CRM (SCM) system enabled information-based coordination is a less risky approach to improving vertical coordination. However, if a focal firm operates in an environment which requires downstream coordination with very unpredictable sales or upstream coordination with a concentrated supplier industry, then CRM (SCM) systems that can reduce the cost of operating with an integrated customer (supplier) present acquisition of customer (supplier) as an alternative mechanism to improve vertical coordination.

The analysis has certain limitations that suggest directions for future research. This research examines the relationship between the presence of ERP, CRM and SCM systems and M&A activities. Future research may examine the relationship between *actual use* of ERP, CRM and SCM systems and M&A activities. For example, examining the relationship between use of ERP, CRM, and SCM systems to coordinate with industry partners, customers, and suppliers, and M&A activities may provide more refined understanding of the impact of enterprise systems on M&A. Future research can also examine the economic impact of the use of ERP, CRM and SCM systems for information and ownership based coordination with business partners. Does the use of ERP, CRM and SCM systems for information or ownership based coordination lead to higher performance? This research focused on the potential acquirers and the impact of acquirer's ERP, CRM and SCM systems on the likelihood of making acquisitions. It is also likely that the implementation of ERP, CRM and SCM systems at potential targets influences a target firm's likelihood of being acquired. It will also be interesting to examine how the implementation of enterprise systems affects a potential target firm's likelihood of being acquired. We found that in our sample the target firm's ERP, CRM and SCM systems did not have significant impact on horizontal, pure vertical and conglomerate M&A. However, the acquirers in our sample are Fortune 1000 firms that are typically much larger than the targets and probably have superior IT capabilities than the targets. Thus, the target's IT systems are not a key consideration in the M&A decision. It will be important to extend this analysis to the more general case where acquirers are not large Fortune 1000 firms, and where acquirers and targets have

comparable IT capabilities.

Chapter II: Acquirers and Targets' Enterprise Systems and Premium on M&A Deals

1. INTRODUCTION

Mergers and Acquisitions (M&As) have become increasingly popular in the last few decades. In 2014 82,354 M&A deals were completed around the world with a total deal value of 4,708 billion U.S. Dollars (Bureau van Dijk 2015). In these deals, acquiring firms typically pay a significant premium above the market value of target firms to persuade shareholders to yield control to the acquiring firm. The average acquisition premium in the past decade paid by firms has been in the range of 30-50 percent of market value (Laamanen 2007). Further, there is considerable evidence from prior M&A events that 70-90 percent of the deals destroyed shareholder value for the acquiring firm (Christensen et. al 2011). Why acquiring firms pay significant sums above the value that the market assigns to the target and circumstances when M&A deals create value for acquirers are both questions of great interest for researchers and for practitioners.

Early work in M&A highlighted that the potential to gain efficiency enhancing scale economies (Singh and Montgomery 1987), and increasing market power (Chatterjee 1986, Kim and Singhal 1993) may be factors linked to acquisition premiums. Empirical analyses also reveal the presence of bandwagon effects in acquisitions in industries during periods of expansion (McNamara, Haleblian and Dykes 2008). Studies have also implicated factors such as national regulatory factors such as accounting standards and shareholder rights (Rossi and Volpin 2004) and

sociocultural factors such as the ability to share resources and learning across national cultures (Stahl and Voight 2008) as explanatory of acquisition premiums. Research also suggests that the value created in M&A is linked to strategic complementarity, cultural fit and the degree of post-merger integration (Bauer and Matzler 2013). However, while there are a variety of different streams of research on M&A that examine value creation and premiums, they each approach the issues involved from disparate but overlapping perspectives. As a result, our overall understanding of M&A actions is fragmented and a fundamental managerial logic that unifies these disparate streams is lacking. To this end, our work focuses on premiums and value creation in M&A through the lens of resource coordination – a capability that is enhanced in firms' adoptions of enterprise systems (Roberts, Galluch, Dinger and Grover 2012, Sarazzin and West 2011).

M&A may allow firms to extend the deployment of their existing resources and capabilities to novel contexts (Capron, 1999; Capron et al., 1998; Kaul, 2012), creating value by improving the performance of the acquired firm (Berchicci, Dowell, and King, 2012). This improvement in outcomes for the joint firm can arise from a variety of sources. For instance, the combined firm can enhance plant productivity, achieve better asset and knowledge utilization by allocating production more efficiently across multiple geographies (e.g. McGuckin & Nguyen, 1995), and improve service delivery (Banker, Chang, & Cunningham, 2003). The joint firm can also make better decisions by pooling information and sharing knowledge among the combined set of operating units (Tanriverdi and Venkatraman 2005). Consistent with this logic, King, Slotegraaf

and Kesner (2008) found that the degree of resource complementarity between acquirer and target firms was positively related to abnormal returns for the acquiring firm. The merger of Delta and Northwest in the airline industry and the merger of Office Max and Office Depot in the office supply industry are typical instances where the premiums (16.8% premium for Northwest, 4% premium for Office Max) were justified by the product-market, resource related and value chain synergies obtained by jointly coordinating the complementary assets and resources of the merged firms.

In addition to the resource deployment perspective, acquisitions are also a means for the acquirers to obtain new resources and capabilities (Ahuja and Katila, 2001, Karim and Mitchell, 2000; Kaul 2012; Puranam, Singh, and Chaudhuri, 2009) allowing them to bridge capability gaps (Capron and Mitchell, 2009) and enter new markets (Helfat and Lieberman, 2002; Lee and Lieberman, 2010). In these instances, the rationalization and restructuring of processes within the broader sets of assets of the combined firm can create benefits from cross selling and branding of the larger portfolio of products. The merger in 2010 of Ticketmaster, the leading concert promoter and seller of concert tickets with Live Nation, the firm that owned major concert venues and was an artist management firm with long term contracts with artistes like Madonna and U2 is an instance where the combination of concert promotion, venue management and artist management capabilities makes the combined firm more powerful and enhances its competitiveness (Rolling Stone 2010).

Whether an M&A is executed to derive value from deploying current resources to novel contexts or for new resource acquisition, the ability to appropriately integrate

the processes of target and acquiring firms is the single most important factor is realizing synergy (Larsson and Finkelstein, 1999) and enhancing the performance of the combined firm (Zollo and Singh, 2004). In this vein, Capron (1999) relate integration to resource redeployment and knowledge transfer between the acquirer and the target and find that resource redeployment and knowledge transfer increased performance. The expectations of synergy in value creation through capability deployment and in capability acquisition and enhancement requires managers to redesign business processes and consolidate the multiple sets of diverse processes of previously separate businesses within a combined firm. In the instance of the Delta and Northwest merger, the firms needed to consolidate assets such as lounges and gates in airports across the world. In the case of the Office Depot and Office Max merger the changes include implementing enterprise-wide changes such as rationalizing manufacturing and production facilities, streamlining logistics and procurement, harmonizing overlapping sales and support functions and developing joint brand strategies and marketing campaigns (Banker 2015).

Increasingly, the ability of firms to integrate resources and processes depends largely on coordination capabilities provided by enterprise systems such as ERP Systems, CRM systems and SCM systems. Insights based on rich and detailed case studies in the IS literature suggest that complex business transformations involve a range of choices regarding the standardization of business processes and the integration of business processes across functional areas and business units (Ross and Weill 2004, Beath and Ross 2010). As information systems become increasingly central to the

management and operational control of enterprises, it is thus not a surprise that recent studies highlight that realized outcomes in M&A initiatives hinge on the challenges of merging the complex information systems of target and the acquiring firms (Yoo, Lyytinen, Heo 2004; Mehta and Hirschheim 2007). In line with this logic, IT M&A integration capabilities of acquiring firms are central to realizing the value in M&A (Tanriverdi and Du 2011; Tanriverdi & Uysal, 2011). Consistent with the resource-based view of value creation in firms we suggest that enterprise systems installed at the acquiring and target firms are central facilitators of the integration processes in M&A initiatives. In this paper we examine the premiums and value from M&A deals from a coordination capabilities perspective. We contend that premiums paid and value realized are likely to be related to the coordination capabilities linked to Enterprise Systems in acquiring and target firms.

2. THEORY AND HYPOTHESIS

M&A are seen as contests between firms in the market for corporate control over the productive resources of potential targets. The central argument underlying this view is that the lower the stock price of the target relative to what it could be with more efficient resource utilization and management (after acquisition), the more attractive the take-over becomes to acquiring firms who believe that they can manage the combined firm more efficiently than currently possible when the target firm is a standalone entity. However, there are often multiple potential acquirers with strategically related resources that can create value through synergies and whose estimates of the economic value created from acquiring the target firm are comparable. As a result, the competitive

bidding among them to acquire the target firm raises the premium (above the market price of the target) to acquire the target firm to equal the synergistic gains from the acquisition. Thus, when markets for corporate control are perfectly competitive, abnormal returns to acquiring firms are expected to be null (Barney 1988). This logic arises from the observation that premiums paid to acquire target firms in competitive markets where multiple firms contend to acquire the target firm rise to equal the net present value of the future stream of revenues created by the synergistic combination of target and acquiring firm resources. This theoretical expectation of no abnormal returns accruing to acquiring firms has consistently been confirmed in empirical studies of the issue (Bradley, Desai and Kim 1988).

In particular, prior research suggests that acquiring firms are likely to experience abnormal returns only in instances when markets for corporate control are imperfect (Barney 1988, Chatterjee 1986, 1992). This occurs when an acquiring firms possesses unique value creating resources and capabilities that competing bidders do not possess and competitors cannot duplicate the synergies and cash flows attributable to these resources. In such instances, the competitive bidding process raises the target premium only to the level of the synergistic value of other potential acquirers. The incremental value attributable to the acquiring firm's unique capabilities are reflected in the abnormal returns to the acquiring firm. Further, for this market imperfection to be sustained and create abnormal returns for the acquirer, the resources endowments or capabilities that create the synergistic value need to be complex and surrounded by causal ambiguity since competing firms would otherwise be able to duplicate this

resource and appropriate the unique value for themselves. Situations and contingencies associated with abnormal returns for acquiring firms therefore continue to be of great interest both to practitioners and academics (Capron and Pistre 2002).

Prior research highlight that the greater the integration of the knowledge and resources of the acquirer and target firm post acquisition, the greater is the performance of the combined firm (Zollo and Singh 2004). Recent work suggests that the IT enabled capability of firms to integrate business processes and operations across multiple businesses is a significant contributor to firm performance after M&As in both the short run and the long run (Tanriverdi and Uysal 2010). Increasingly, these firm capabilities are based on investments by firms in enterprise systems that allow managers to integrate resources across the enterprise to realize resource synergies of multiple business units and minimize disruptions during M&A integration. Enterprise system implementations are complex multi-year projects that are successful and create advantages when they are driven by a vision for the role of information technologies in the firm (Ross and Weill 2006, Robertson and Fonstad, 2006). For instance, Tanriverdi and Du (2011) highlight how EMC's wide set of enterprise systems for Financial accounting, Human Resource Management, Salesforce Management, Customer Service, Indirect fulfilment, Logistics and Manufacturing enabled the firm to effectively integrate the business operations of the 50 business that it acquired between 2005 and 2010 to become a vendor of comprehensive hardware and solutions to large enterprises. The integration of business processes across multiple units is a complex task that involves a large number of interdependent processes that need to be coordinated between businesses that often

prioritize the achievement of their individual unit objectives rather than the broader enterprise goal (Ross, Weill and Robertson 2006).

Cross-business information technology integration capabilities that allow firms to integrate IT infrastructures, combine IT applications such as human resources and vendor management systems and IT strategy management processes across business units enable firms to appropriate gains from synergies in M&A activities (Tanriverdi and Uysal 2010). The work of Du (2015) highlights the variety of capabilities provided by a firm's IT assets (i.e., IT extensiveness) and the level of IT Standardization of IT infrastructure and applications as important determinants of the flexibility of IT resources in M&A integration. Greater IT extensiveness and IT standardization within the acquiring firm is likely to help managers make discriminating choices to integrate business processes across business units including the target firm to translate the potential synergies from resource combination into actual value. This leads us to suggest that the greater the IT extensiveness and the IT Standardization of a firm's enterprise systems, the greater is the unique value a firm can create through synergistic resource combinations with a target firm in an M&A. This is likely to involve the new combinations of knowledge and firm resources into resource bundles that create unique opportunities for new products, service and new avenues for growth for the combined firm (Argyres and Zenger 2012). The capabilities provided by enterprise systems for resource coordination are also likely to allow the firm to accomplish cross-unit process integration with minimal disruption to business operations, reducing the overall costs of the integration process. Therefore, the combined effect of the enhanced potential for

value creation and the reduced costs of post-merger integration are likely to position the firm advantageously with respect to the value it can create from acquiring target firms in comparison with other firms also bidding for the target. The incremental value created by the IT competencies are unlikely to be duplicated by competitors and are thus likely to be retained by the acquiring firm. We therefore hypothesize that

H1a: The greater the extensiveness of the enterprise systems at the acquiring firm, the greater is the abnormal return to the acquiring firm.

H1b: The greater the standardization of the enterprise systems at the acquiring firm, the greater is the abnormal return to the acquiring firm.

2.1 M & A Premiums

The strategic motives for acquirers in M&A are driven by their desire to derive benefits from the potential synergies from integrating the resources of target firms and enhance overall enterprise performance. The extent of benefits the acquirer can realize in future periods from the acquisition is an assessment that managers in acquiring firms need to make when they enter the bidding contest for a target firm. In making this judgment, acquiring firms face ex-ante information costs associated with the difficulty of identifying and evaluating both the resources and capabilities of target firms and the synergies from combining with the target. While the due diligence process allows firms to obtain detailed and reliable private information from the target firms about the target's current financial position, future projections and the valuation of their assets; it often does not convey details about the quality of a target's resources and the target's

ability to be integrated into the acquiring firm. A typical instance of an acquirer mis-estimating the synergy benefits is illustrated in the acquisition of the Boston Globe by the New York Times for $1.1 Billion in 1993 (Christenson et. al 2011). The acquisition was justified by the expectation of operating synergies from combining the resources of the two well established firms in the same industry operating in different markets. However, after acquisition, the New York Times faced considerable resistance to changes from the entrenched culture of the 120 year old Boston Globe that created difficulties in realizing the expected operational synergies. The editorial and reporting staff of the Boston Globe preferred to retain their independence and the labor unions involved in printing and other operations complicated and hampered the streamlining of back office and administrative processes. Most of the synergistic benefits projected for the acquisition never materialized and The Times finally divested the Boston Globe for $70M in 2013 (NY Times Aug 3, 2013). Similarly, Arby's and Wendy's merged in 2008 in a deal valued at $2.3B with the expectation that combining the resources of the two firms would create a world class company with the scale and expertise to enhance their competitive position in the restaurant industry. The firms expected that the combination would enhance operational efficiencies, enable innovative new products and lower costs through the sharing of administrative services (ref news release). However, the combined company failed to realize the expected synergy benefits and struggled to merge the operations of the two firms which continued to be operated independently till Arby's was divested in 2011 for $430 Million.

Each of these represents instances of acquisitions that involved significant

premiums and not achieving the expected synergistic benefits of relatedness and complementarity. These instances highlight the ex-ante difficulty of identifying and evaluating both the capabilities of target firms and the complexity of implementing the changes to achieve synergies from combining operations with the target. Target firms have natural incentives to inflate their representation of the quality of their firm in order to command a higher sale price, further contributing to the information asymmetries that acquiring firms have to resolve.

Prior research has suggested that high premiums in M&A deals are linked to agency considerations such as senior executives engaging in opportunistic behaviors that create personal gains since acquisitions that increase firm size also increase executive compensations as well as prestige ((Trautwein 1990). One of the widely cited explanations for M&A premiums is from the work of Hayward and Hanbrick (1997) whose empirical analysis suggests that the level of CEO hubris and exaggerated self-confidence from past performance, media praise and importance signaled by high CEO pay are associated with higher premiums in M&A and lower firm performance after M&A events. This particular explanation is also supported in recent work suggesting the firms with CEOs with a high level of overconfidence in their own judgments also pay higher premiums in M&A deals (Malmendier and Tate 2008). However, while the CEO and top management team does exert considerable influence on decisions in M&A activities, agency based explanations for critical decisions that view M&As decisions from an individual level of analysis appear unsatisfactory since these important decisions generally involve a large number of individuals from the Business

Development and Strategy groups, investment bankers, lawyers and business consultants (Hitt et. al 2001 book).

An alternative perspective suggests M&A premia as being driven by group characteristics and shared perspectives within interorganizational networks (Haunschild 1994, Bechkman and Haunschild 2002). M&A premiums paid by acquirers are influenced by premia paid in prior deals by other firms linked to the focal firm through board interlocks and to the premia paid by other firms advised by the same professional firm (Haunschild 1994). Beckman and Haunschild (2002) find that network learning is an important determinant of premiums and that firms tied to others with heterogeneous prior premium experience tend to pay less for their acquisitions and have better performing acquisitions than those tied to others with homogeneous experience.

M&A premia are clearly judgments about firm value that acquiring firms make based on uncertain and ambiguous information inputs and it stands to reason that network learning plays an important role in determining premiums. The findings of Beckman and Haunschild (2007) that acquiring firms pay lower premiums when their network partners have completed deals of diverse sizes provides evidence that M&A premiums are informed by heuristics about valuation that are collectively refined by firms pooling their M&A experiences in inter-organizational networks.

These arguments thus provide credence to perspectives in the literature that M&A premia, rather than being linked to agency related causes and individual failings, should instead be viewed as imperfect judgments by well-meaning groups with limited or incorrect information and difficulties in seeking inputs from knowledgeable

individuals, factors that all point to decision making hampered by limitations in information processing capabilities (Sirower 1997, Villalong and McGahan 2005). The overpayment reflected in the premium is higher when it is more difficult for the acquiring firm to evaluate the value of synergies from the combination (Laamanen 2007). Problematic decisions in M&A contexts thus reflect the limitations in making decisions under conditions of uncertainty and ambiguity (Puranam, Powell and Singh 2006).

Sirower (1997) suggests that M&A premia are caused by individuals and groups making decisions while being unfamiliar with or not fully sharing critical elements of the firm's acquisition strategy. Premia are also inflated by a lack of adequate information available to decision makers regarding the target firm and specifics of the operating environment and by mistaken assumptions regarding future trajectories. For instance, Sirower (1997) highlights how acquirers can arrive at inflated assessments of a target's value when they fail to consider critical contingencies such as changes to regulatory and financial factors that may drastically alter key assumptions incorporated in financial projections. Also, M&A premia may also be inflated by not fully accounting for the complexity of the integration process. As Christensen et. al (2011) observe: "every day, the wrong companies are purchased for the wrong purpose, the wrong measures of value are applied in pricing the deals, and the wrong elements are integrated into the wrong business models. Sounds like a mess – and it has been a mess. But it need not be." (last page).

This highlights that firms' overpayment in M&A is linked to poorer information

processing capabilities and that lead to incorrect judgments and poorer decision making. We suggest that firms that have invested in enterprise systems across a larger variety of functional areas, with higher ES extensiveness are likely to have the advantage of being able to consolidate and obtain detailed information that can provide a more realistic picture of potential synergies. Further, the level of ES standardization with in the firm enhances the quality of the information environment available to make the M&A. For instance, firms where senior executives have full visibility to the pool of managerial talent made possible by a unified HR system across all their divisions can easily identify individuals with knowledge and specialized experience in the business, geography and the context of a target firm being considered, to derive inputs to validate judgments made by the executive team. An integrated information environment characterized by high ES extensiveness and high ES standardization can enable executive teams to draw on dashboards presenting analytics on detailed plant data or sales from different geographies and run simulations to project the synergies and value gained from acquiring the resources of potential targets. The support for executive decisions incorporated in ES can help managers visualize scenarios and outcomes for the firm under different sets of changes to environmental conditions. For instance, Christenson et. al (2011) provide anecdotal evidence to suggest that acquisitions made for the purpose of cross-selling are only occasionally successful. To verify if this claim is indeed a valid concern in their own industry, decision makers in enterprises with access to an integrated and standardized ES infrastructure would be able to extract divisional sales data on similar contexts and empirically confirm if this was the case in their

industry or in the context of the target.

Further, the processes of decision making in contexts with high levels of ES extensiveness and ES standardization are likely to be more disciplined and systematic. Such an environment would allow collaborative decision making as well as enable a wider group of individuals from across different functions and business units to be easily polled and called upon for inputs. The decision processes for M&A in such firms are therefore less likely to lead to escalations of commitment (Haunschild, Davis-Blake and Fichman 1994) and have fewer biases in decision making such as overlooking negative information revealed late in the process (Puranam, Singh and Powell 2006). Overall, we suggest that the level of ES extensiveness and the level of ES standardization which reflect the quality of the information and knowledge infrastructure used to support decision making can help firms make better judgments regarding the value gained by acquiring target resources. This leads to

H2a: The greater the extensiveness of the enterprise systems at the acquiring firm, the lower are the premiums paid in M&A deals.

H2b: The greater the standardization of the enterprise systems at the acquiring firm, the lower are the premiums paid in M&A deals.

2.2 Target Firm Perspective

Prior research on information technology investments suggests that these investments can create significant value for firms (Aral and Weill). However, studies also highlight that the complementary changes to operational processes and organizational structures associated with technology adoption can be disruptive, leave firms facing competitive

disadvantages and are thus potentially risky (Tanriverdi and Ruefli 2004, Dewan, Shi and Gurbuxani 2007). Studies of the expectations of value creation by the stock market linked to firms IT investments present a mixed picture. Firms investing in IT experienced abnormal returns only for innovative applications of technology (Dos Santos et. al 1993) or when technologies are novel as in the case of e-commerce technologies (Subramani and Walden 2001). Some studies suggest that IT investments enhance market value for small firms rather than for large firms (Im, Dow and Grover 2001) while others find IT investment announcements enhancing market value only for investments viewed as transformational and in industries where technologies are viewed as being strategic (Dehning et. al 2003). Some studies even find IT investments reducing market valuations (Hunter 2003). Studies examining Enterprise Systems announcements suggest that enhancements in market values for ES projects high in functional scope (number of modules) and extent of deployment (number of sites) than for those where the investments are more narrow (Ranganathan and Brown 2006). Recent studies provide a more nuanced view, suggesting that IT investments reduce downside risks and enhance competitive performance when these investments are aimed at enhancing the quality of decision making and enhancing innovation related processes (Otim, Dow, Grover and Wong 2012). Further, these benefits are larger for firms that lead their industries in making technology investments than firms that are late adopters.

Taken together, these studies provide compelling evidence that information technology investments contribute to considerable asymmetries in assessments of benefits between the stock market and managers within the firm and that target firms

with significant investments in technology are difficult for analysts in the market, and external to the firm, to appropriately value. Since markets are likely to adopt a conservative stance in valuing firms, this suggests that a firm's market value may not fully represent the true value of the future cash flows created through its IT investments.

This asymmetry, arising from the difficulty of assessing the value created through a firm's IT investments by the market, has significant consequences for the premiums paid for a target firm with significant investments in enterprise systems. Acquirers use investment advisors and perform detailed analyses of target firms' capital investments and the information systems supporting firm processes as part of the due diligence process (Yetton et. al 2013). Further, since a target firm is motivated to compensate for their conservative valuation by providing considerable evidence to signal the value created by their ES investments to potential acquirers (Reuer, Tong and Wu 2012), acquiring firms are likely to arrive at a private assessment of the target's value that are higher than those of the market.

Further, since shareholders of target firm are also likely to recognize the conservative assessment of value created by the firm's Enterprise systems investments by the market, they are unlikely to sell their shares to acquirers unless they are paid a premium above the current market price. Both ES extensiveness and ES standardization (that reflects the firm's managerial quality in integrating the variety of firm operations) are likely to be related to higher future benefit streams. As a result, the asymmetry between the market's valuation and the private valuation is likely to be higher in targets with more extensive scope and scale (ES systems that are more extensive and ES that

are more standardized). Further, ES extensiveness and ES standardization of a target firm are likely to enhance the private, difficult-to-imitate benefits that an acquirer can gain through combining the resources of the target with their own. Higher levels of ES extensiveness and ES standardization are also likely to simplify the complexity of process reconfiguration and restructuring in the post-acquisition period and reduce the overall costs of integration, leading to a greater assessment of the value of the target and greater premia. We therefore hypothesize that

H3a: The greater the extensiveness of the enterprise systems at the target firm, the high the premiums paid in M&A deals.

H3b: The greater the standardization of the enterprise systems at the target firm, the higher the premiums paid in M&A deals.

3. DATA AND EMPIRICAL TESTING

3. 1. Sample construction

I use data on merger and acquisition announcements from year 2009 to 2014. In our sample, both the acquirer and target firms are public firms headquartered in the United State or Canada. The M&A announcements are extracted from Securities Data Corporation (SDC) database. Our dataset combines data from the following five sources: (1) *Securities Data Corporation (SDC) database* provides information on mergers and acquisitions, including acquirer and target firm information, deal characteristics and premium paid for the target firm, (2) *Compustat* provides the firm-level control variables, (3) *Center for Research in Security Prices (CRSP)* provides stock price information.

Market capitalization of the acquiring and target firms, as well as the cumulative abnormal return are both calculated using the outstanding share and stock price data provided by CRSP, (4) *Harte & Hanks CI database (Harte & Hanks)*. Explanatory variables including enterprise system implementation (extensiveness and standardization) are obtained from the Harte-Hanks CI database, and (5) *Bureau of Economic Analysis (BEA)*. The industry relatedness data is drawn from BEA.

There are two major samples used in this paper. The first one matches the acquirer in the merger and acquisition announcements to all the other data sources mentioned above (acquirer sample). The second sample matches the target firm to other data sources. The following table provides the details on how the acquirer sample and target samples are generated.

	CONSTRUCTION OF THE ACQUIRER SAMPLE	**CONSTRUCTION OF THE TARGET SAMPLE**
STEP 1	**Extract SDC deals.** Extract all the SDC deal announcements between year 2009 and 2014. • Remove the M&A announcements with deal form or type being buyback, exchange offer, recapitalization, repurchases, and self tender offer. • Keep all the deals with publicly traded acquirers.	**Extract SDC deals.** Extract all the SDC deal announcements between year 2009 and 2014. • Remove the M&A announcements with deal form or type being buyback, exchange offer, recapitalization, repurchases, and self tender offer. • Keep all the deals with publicly traded target firms.
STEP 2	**Match the acquirer to Harte & Hanks database.** Used standardized firm names to link SDC	**Match the target to Harte & Hanks database.** Used standardized firm names

	acquirers to Harte & Hanks firms. The standardization of firm name comes from the NBER patent data project, which matches patent data to Compustat.	to link SDC target firm to Harte & Hanks firms.
STEP 3	**<u>Match to Compustat.</u>** Match the data in step 2 to Compustat using ticker and CUSIP of the acquirer provided in SDC (validated by the name of the firm).	**<u>Match to Compustat.</u>** Match the data in step 2 to Compustat using ticker and CUSIP of the target provided in SDC (validated by the name of the firm).
STEP 4	• Remove the deal if the acquirer's market-to-book ratio or ROE is higher than 100 (Schwert, 2000). ***<u>4,935 M&A announcements matched.</u>***	• Whenever there are several bids for the same target (occuring within one year of the first bid), we keep only the first bid (to remove the possible confounding effects from other bids). • Remove the deal if the target's market-to-book ratio or ROE is higher than 100 (Schwert, 2000). ***<u>908 M&A accouncements matched.</u>***

3. 2. Measurements

Dependent variables:

I use an event study methodology (Brown and Warner 1980 1985) to study the forward-looking expectation of the capital market on merger and acquisition announcements. The

assumption here is that the capital market is efficient, i.e., all the publicly available and relevant information on the acquiring and target firms is incorporated and reflected in the stock price. There are two sets of dependent variables. The first dependent variable is the offer premium. It is measured as the premium of offer price to target closing stock price 4 weeks prior to the original announcement date, expressed as a percentage ((offer price – target closing stock price 4 week prior) / target closing stock price 4 week prior) * 100[14]. The second dependent variable measures the market reaction to the announcement of the M&A deal. It is defined as the cumulative abnormal return (CAR), measured relative to a CRSP value-weighted market model. I used multiple measures of CAR:

- CAR_runup is market-adjusted return to the stock trading days (-63, -1) before the announcement of the deal (Schwert 2000).

$$CAR\_Runup_i = \sum_{t=-63}^{-1} R_{it} - \alpha_i - \beta_i R_{mt}$$

  Where R_{it} is the return for a sale to the acquiring or target firm on trading day t, R_{mt} is the return on the Standard & Poor's Composite Index on day t. The market model regression parameters, α_i and β_i, are estimated using data for the 253 trading days ending at day -64, $R_{it} = \alpha_i + \beta_i R_{mt} + \epsilon_{it}, t = -316, \dots, -64.$

- CAR_markup is market adjusted return to the stock in trading days (0, 126) after the announcement of the deal (Schwert 2000). See the formula for CAR_runup above.
- CAR_premium is the sum of CAR_runup and CAR_markup.

[14] I also used premium of offer price to target closing stock price 1 weeks prior to the original announcement date to check the robustness of our first dependent variable.

- CAR_(-2,2) is a cumulative abnormal return in a five day window around the announcement of the merger and acquisition deal (-2, 2), where the announcement day is day 0. See the formula for CAR_runup above. The market model regression parameters, α_i and β_i, are estimated using data from trading day -205 to -6: $R_{it} = \alpha_i + \beta_i R_{mt} + \epsilon_{it}, t = -205, \dots, -6.$

Independent variables:

The first set of independent variables is the enterprise systems (ES) of the acquiring and target firms. These two variables are calculated from information provided by Harte & Hanks database. For each site of the focal firm, Harte & Hanks conducted surveys on an employee at the site who is directly involved in information technology management at the site. The survey asked the respondent the status of implementation of a list of modules of ES (installed or planned). We coded the module availability as 1 when it is listed as "installed".

ES extensiveness. The ES extensiveness variable is constructed using Principal Component Analysis (PCA) on the following modules: accounting/finance (ACC), human resources (HR) and workflow (WORKFLOW), customer relationship management (CRM) and supply chain management (SCM) software. Harte-Hanks database provides information on ACC, HR and WORKFLOW, CRM and SCM module implementation in each site of the firm (1 if implemented, 0 otherwise). ACC, HR and WORKFLOW, CRM and SCM module implementation at the site was weighted using the number of employees to generate firm-level module implementation. Then I conducted Principal Component Analysis on the firm-level ACC, HR, WORKFLOW,

CRM and SCM module implementations. From the result of the PCA, I take the first principal component (it has an eigenvalue of 3.57 and is the only component with an eigenvalue higher than 1) as my measure of ES extensiveness.

ES standardization. Within the same firm different sites could be using different vendors for the same ES software. For example, one site in General Motors implemented PeopleSoft for CRM while other sites are using Salesforce. While ES extensiveness captures the scope/breadth of the ES tools used by the focal firm, another aspect of ES is within the same tool how standardized it is across member sites of the firm. I use an entropy measure to measure the diversity of the software products used across the sites of the firm. The ES standardization for software i at time t is calculated as follows:

$$\mathrm{STD_{it}} = -\sum_{j=1}^{M_{it}} \left(\frac{Size_{jit}}{Size_t} * ln \frac{Size_t}{Size_{jit}} \right)$$

Where i is a type of software – for example, CRM software. j stands for a vendor within the software i. M_{it} is the number of different vendors of software i used by the firm. $Size_t$ is the size of the focal firm (total number of employees). $Size_{jit}$ is the size of the sites who use the jth vendor for software i. The average of the five STD measures for ACC, HR, WORKFLOW, CRM and SCM software is used as the measure of ES standardization.

The second set of independent variables is the vertical and horizontal relationship between the acquiring and target firms' industries. Given the primary industries (6 digit NAICS code) the acquiring and target firms are in, I use the Input-Output Use table from the BEA and construct a continuous ***Vertical Relatedness Index (VRI)*** for every industry

pair. For each industry pair i and j, the VRI is defined as the maximum of the dollar value of input from industry i (j) in order to produce one dollar of industry j (i)'s output (Fan and Lang 2000). The ***horizontal complementarity coefficient*** measures the degrees to which industries i and j share their output and input. From the Use Table provided by BEA, I compute for each industry the percentage of its output supplied to (percentage of its inputs required from) each intermediate industry k, denoted as b_{ik} (v_{ik}). For each pair of industries i and j, the correlation coefficient between b_{ik} and b_{jk} (v_{ki} and v_{kj}) across all k except for i and j is calculated as the output correlation (input correlation). A large output (input) correlation suggests a significant overlap in the markets to which industries i and j sell their products (the inputs industries i and j need). The horizontal complementarity coefficient is the average of the output and input correlation, i.e., $C_{ij} = 0.5 * [corr(b_{ik}, b_{jk}) + corr(v_{ki}, v_{kj})]$ (Fan and Lang 2000).

Control variables:

I control for other factors mentioned in the literature that might affect premium and market reaction to a M&A announcement. These control variables include deal characteristics, accounting performance of the acquirer and target, financial advisors and anchoring effects.

Deal characteristics:

- ***Hostile***. An acquisition is considered hostile if the attitude field in SDC was marked as unsolicited or hostile.
- ***Tender offer***. Tender offer is a dummy variable equal to one if the bid involved a tender offer (as recorded in SDC).

- ***Toehold***. Toehold is a dummy variable equal to one if the fraction of the target's common stock owned by the bidder is greater than 5% at the bid announcement date or zero otherwise (Officer, 2003).
- ***Merger of Equals***. Merger of Equals indicator is 1 when the target and acquirer in a stock swap transaction have approximately the same market capitalization, and the ownership of the new entity will be owned roughly 50/50 by the target and acquirer shareholders. Both companies should also have close to equal representation on the board of the new company (defined in SDC).
- ***Number of competing bids*** for the same target.

Financial advisors and anchoring effects:

- ***Anchoring effect***. In order to control for the anchoring effect, I added the preceding acquisition premium as a control variable. The preceding acquisition premium is the premium paid by another firm that made the acquisition directly preceding the focal deal in a given country and target industry (four-digit SIC code). This measure is consistent with Melhotra et. al. 2015.
- ***Financial Advisor average premium***. I also control for the average premium paid on all transactions involving the same investment banking firm during the prior three years (Haunschild 1994). When multiple advisors are used, the average is used.

Accounting performance:

- ***Return on equity (ROE)*** measured as the ratio of earnings to average equity for the prior fiscal year.
- ***Market/book (M/B)*** ratio measured as the ratio of the year-end market value of common stock to the book value of equity for the prior fiscal year.
- ***Size*** measured as the log of equity capitalization (in thousands of dollars) on the last day of the year prior to the deal announcement.

Selection CAR:

- ***Selection_CAR*** is the additional variable added to the first stage of the Heckman two-step model. In order to estimate the Heckman two-step selection model, we need to add at least one additional variables in the first stage that is not included in the second stage model. This additional variable we used is the cumulative abnormal return of the firm's stock for the previous two years (Palepu, 1986; Comment and Schwert, 1995; labelled as selection_CAR). It is estimated using the third year prior to the forecast year with CRSP value-weighted market model. Selection_CAR measures the stock market performance of the focal firm, which affects the likelihood of a firm acquiring or being acquired. Firms with high performance tend to acquirer and the bad performers tend to get acquired (Comment and Schwert 1995; Gaspar, et. al, 2005).

3. 3. Empirical strategy

A potential selection bias is that ES implementation (extensiveness and standardization) increases the likelihood of a firm entering an M&A transaction, either being an acquiring or target firm. Only when the acquisition takes place is it possible to observe the outcome

variables in this paper: premium and stock market reaction. To address this issue, I use Heckman two-step correction to solve the potential selection bias.

Acquirer selection model:

In the first stage, a Probit model of the likelihood of acquiring is estimated.

$$h_k^* = X_{EIS\ extensiveness+standardization,k}\alpha + X_{control,k}\beta + \varepsilon_k$$

h_k^* is the latent unobservable variable that represents the value of acquiring the target firm. h_k is a dummy variable indicating if a M&A deal took place: $h_k = 1\ if\ h_k^* > 0;\ h_k = 0\ if\ h_k^* < 0.$

In order to estimate the above Probit model (first stage of the Heckman two-step model), I expanded the data beyond the firms that were taken over. I constructed the *universe of the firms,* that is composed of firms that have a chance to acquire or get acquired from 2009 to 2014. The universe of the firms is constructed by matching all the Harte & Hanks firms available in Compustat using standardized company names (validated by address and size of the firm). 4,976 unique firms are matched across six year from 2009 to 2014.

There is one more complication in the acquirer selection model: if a firm decided to acquire, only when the target firm is publicly traded is it possible to observe the premium. Therefore, I estimated two Probit models in the first stage: (1) estimate the likelihood of a firm in the universe of firms to acquire in a specific year; (2) given that the firm is an acquirer in that year, estimate the likelihood of the acquirer taking over a public target. Explanatory variables in (1) include potential acquirer ES extensiveness and standardization, size of the potential acquirer (log of market capitalization from the

previous year), accounting performance including ROE and market-to-book ratio from the previous year and selection_CAR. Explanatory variables in (2) include selection_CAR, size of the acquirer and market-to-book ratio.

Target selection model:

The target selection model is similar to the acquirer selection model. The same *universe of firms* is used for the estimation; the only difference being that in the first stage, only one Probit model is estimated: the likelihood of a firm being acquired. The variables used to do the first stage estimation include ES extensiveness and standardization, size of the potential target firm (log of market capitalization from the previous year), accounting performance including ROE and market-to-book ratio from the previous year and selection_CAR (the additional variable added in stage 1 estimation, consistent with Gaspar et. al. 2005).

4. RESULTS

4. 1. Descriptive statistics

Acquirer sample:

The acquirer sample contains 4,935 M&A bids. Both acquiring and target firms in this sample are firms headquartered in the United States or Canada. All the acquirers are publicly traded firms. Among these deals, 2% of them are tender offers, while 1% show hostile attitude from the target firm towards the bidder (table 10). The average premium of these deals is 53%. However, only about 8% of these deals disclosed the premium information (407/4,935). These deals on average have much lower acquirer abnormal return than the target abnormal return in the target sample. Compared to the universe of

the firms, the firms in the acquirer sample have lower level of ES standardization (compare table 10 with table 14). These acquirers (average ROE equals 0.05) also performed better than firms in the universe (average ROE equals 0.01). However, the CAR from the previous two years show that firms in the acquirer sample (selection CAR is 0.02) underperform compared to the other firms in the universe (selection CAR is 0.06).

Target sample:

The target sample contains 908 deals. These target firms are all publicly traded firms headquartered in The United States or Canada. Among these deals, 15% of them are tender offers, while 7% show hostile attitude from the target firm towards the bidder (table 12). On average, the premium calculated using stock price 4 weeks prior to the announcement of the deal is 42%. These deals also show a positive market reaction towards the target firm on average. Compared to the universe of the firms, the firms in the target sample have higher level of ES extensiveness and standardization (compare table 12 with table 14). The firms in the target sample have slightly higher market to book ratio on average (1.9) compare to the universe of firms (1.57). However, the CAR from the previous two years show that firms in the target sample (selection CAR is -0.08) underperform compared to the other firms in the universe (selection CAR is 0.06).

4. 2. Sample selection bias

Ideally, I have complete data on all the biddings occurred. However, the data is not complete for many deals when it comes to ES information, premium, stock-price performance and other control variables. For example, between year 2009 to 2014; 5,717

mergers and acquisition deals occurred with public target firms headquartered in Canada or United States. However, only 3,149 of them have the premium information available (based on stock price 4 weeks prior). Also, only 3,076 of the target firms can be matched to Compustat.

Tables 15.1-15.4 compare the ***acquirer sample*** with all the deals (2009-2014) occurred with both acquirer and target headquartered in Canada or United States and acquirer being a public firm (22,498 M&As). Tables 15.1-15.4 have the same full sample (22,498 deals) with different complete samples. For example, table 15.1 shows that only 214 deals out of the 22,498 have complete data on premium, ES extensiveness and all the control variables. Highlighted variables indicate a significant difference in mean between the full and complete samples (two-sample t test). Table 15.1 indicates that compared to all the other deals that happened between 2009 and 2014, the acquirer sample has a significantly higher proportion of hostile deals, tender offers, and merger of equals. These deals with complete data are more vertically and horizontally related, and much higher in transaction value. The acquirers with complete data faced significantly more competitors for the same target firm and these acquirers are much bigger than the rest of the acquirers (acquirer common equity and sales). However, these acquirers were not performing significantly differently (ROE and market to book ratio). And the target firms in the complete sample are no different from the rest of the targets when it comes to size (target total assets, target common equity).

Tables 16.1-16.4 compare the mean of variables in the ***target sample*** with all the deals occurred with public target firms headquartered in Canada or United States between

2009 to 2014 (5,717 M&As). Again, tables 16.1-16.4 have the same full sample (5,717 deals) with different complete samples. Compared to the full sample, the target sample has a significantly higher proportion of hostile deal, tender offers, and merger of equal while the proportion of deals with toehold is lower. Also, there are more related deals in the target sample (both vertically and horizontally) than the full sample. Transaction value shows that the value of deals in the target sample is significantly larger. However, there is no significant difference when it comes to accounting performance (ROE and market-to-book ratio). Table 16.1-16.4 indicates that the target firms with complete data are significantly different from firms with missing data. Firms in the target sample are bigger and more related to the acquiring firm.

4. 3. Results of the selection models

Tables 17.1 and 17.2 report the results from the acquirer selection model. I report two sets of results: one with only acquirer ES extensiveness as the explanatory variable (tables 17.1); one with both ES extensiveness and standardization (tables 17.2). The reason to do so is due to the fact that the standardization variable is non-missing only when the firm has at least one of the modules in ES. Therefore, the coefficients of ES extensiveness and standardization in tables 17.2 can be interpreted as given that the acquiring firm has ES, what is the impact of ES on premium and acquirer short-term stock performance. The stage 1 result in table 17.2 shows that both acquirer ES extensiveness and standardization decrease the likelihood of a firm acquiring (model 1). Also, larger firms are more likely to become an acquirer. Given the firm is an acquirer in a given year, larger firms also are more likely to acquire a public target (model 2).

Models 3 and 5 show that the acquirer's ES extensiveness is negatively related to the premium the acquirer is willing to pay for a target firm. When ES extensiveness increases 1 SD (2.01), the premium paid decreases 13.5% (2.01*-6.713). However, both ES extensiveness and standardization are positively related to CAR (-63, 126), meaning the acquirer's shareholders are reacting positively to the M&A deal.

Tables 18.1-18.4 report the results of the target selection model. . Tables 18.1 and 18.2 do not include ES standardization, while tables 18.3 and 18.4 have both ES extensiveness and standardization as explanatory variables. The stage 1 results indicate that both target ES extensiveness and standardization increase the likelihood of a firm being acquired (model 1 and 5 in table 18.3). Also, it is less likely for a larger firm to become a target (model 5 in table 18.3). The stage 2 results show the impact of ES on premium and market reaction towards the target after correcting for the selection bias. Tender offers have a positive effect on the premium and CAR (-2,2). Consistent with Officer (2003) and Schwert (2000), target size (although not significant), market-to-book ratio (models 10 and 11 in table 18.4), and toehold (model 4 and 7 in table 18.3) are negatively related to the premium and stock market reaction. Vertical relatedness has a negative impact on premium paid (9.3, 2-4) and positive impact on the market reaction (although not significant). The horizontal complementarity between the acquirer and target increases both the premium and market reaction.

Both target ES extensiveness and standardization increase the premium received by the target firm and short-term stock return (table 18.3). The positive impact of ES extensiveness is even higher when the M&A deal is vertically related (4 of table 18.3).

This is consistent with hypothesis 3a and 3b. In model 2, when ES extensiveness increases one standard deviation (SD, which is 2.14), the premium received increases 7.63% (which is approximately 15% of the average premium in the sample). When ES standardization increases one standard deviation (0.64), premium increases 10.8% (0.64*16.9). In model 6, when ES extensiveness and standardization increase 1 SD, the CAR (-2,2) increases 0.039 and 0.08 (2.14*0.0181 and 0.64*0.126).

5. DISCUSSION AND CONCLUSION

This paper seeks to contribute to the emerging debate on the value created by the significant investments by firms in information technologies that some estimates suggest account for over 50% of firms' capital investments in the past decade. In particular, we witness firms moving from customized software to supporting business processes and decision making by implementing Enterprise Systems that typically involve multi-year, multi-million dollar commitments for the transition. While these complex projects are considerably disruptive to operations and often result in performance dips in the short and medium term (McAfee 1992), these projects have been justified based on the future benefits from coordinating and integrating business processes across enterprises; improving coordination and integration of resources across multiple functional and business units in the firm; the provision of real-time, accurate enterprise wide information for managers; as well as superior analytical tools and collaboration capabilities for decision making. However, there have been few empirical studies of the value of the benefits from these complex systems. We are also not aware of any a large scale empirical examinations of the relationship of superior resource coordination and

information provision capabilities provided by Enterprise Systems to the important managerial decisions regarding changes to the boundaries of the firm through mergers and acquisitions.

The role that information technologies can play in regard to merger and acquisitions is currently under-appreciated, as suggested by observations that fewer than 25% of firms involved the CIO in deliberations and decision processes for M&A initiatives (Yetton et. al 2013). Our results that the extensiveness and standardization of ES within enterprises are significantly associated with both market value enhancement of the acquirer as well as high market valuation for the target highlights the important role information systems play in the creation as well as the deployment of firm resources and capabilities that deliver competitive advantages to firms.

Our results have several important implications for research and for practice. First, for acquirers, the extensiveness as well as the degree of standardization of their enterprise system influences the level of unique potential synergies created for the acquirer that other contenders for targets are unlikely to be able to duplicate. Second, the availability of reliable and current information from multiple functional groups and business units that can be easily consolidated for decision making, and the availability of tools for financial modeling and simulations of different scenarios, enables senior executives to make informed and evidence based decisions in key aspects of M&A such as target choice and target firm valuation. This enables the acquirers to accurately assess the unique synergy that can be realized in the acquisition, thus preventing the acquirer from overpaying for the acquisition.

This is re-assuring evidence to firms that the complex, multi-year projects to implement enterprise systems across the firm combined with architectural guidelines and governance policies to ensure that these systems are standardized and interoperable, can benefit the firm through the flexibility of resource acquisition and deployment (such as to enter new markets and geographies) to respond to changes in the industry and the economy. In particular, these actions provide competitive advantage in allowing firms to create value through M&A that is not available to competing firms without the foresight and managerial vision to incorporate ES extensiveness and ES standardization in the digital transformation of their business processes and IT capabilities.

For target firms, that are often smaller, our results highlight that the value realized by shareholders when they are acquired are positively associated with enterprise system extensiveness and standardization. This is an interesting finding that, even for relatively smaller firms, it is important for them to invest in creating an information infrastructure across their business through enterprise systems and ensure that it is standardized. An extensive and standardized enterprise system allows their resources and capabilities to be accurately valued by the market. The extensiveness and standardization of the enterprise information also assures a potential acquirer that the acquirer can easily integrate the target in their operations, increasing the market value of the target.

In the selection model for the acquirer, the extensiveness and standardization of the acquirer is negatively related to acquisitions. This suggests that firms with extensive and standardized enterprise systems prefer to use information based coordination with partners, rather than acquiring them. However, if they do make an acquisition, they have

lower cost of integration compared to an average acquirer as they can “rip and replace” the information systems of the target with their own enterprise systems. This is one of the reasons that the market responds positively to acquisitions by such acquirers. However, in contrast to the acquirers, the targets with extensive and standardized enterprise systems are more likely to be acquired. This may mean that even when acquirers expect to rip and replace the targets enterprise systems (if any), acquirers value the target having gone through the process of implementing an extensive and standardized enterprise system as such targets are better prepared to implement the acquirers enterprise systems. It is also possible that many acquirers are acquiring targets with extensive and standardized enterprise systems as they may replace their own systems with the extensive and standardized systems of the target firm.

Further research can examine how the systems of the target firm change after an acquisition. Are the systems of the target “ripped and replaced” with the systems of the acquirer after an acquisition, or are they allowed to keep their existing systems. Also, is there any difference in this regard between targets with extensive and standardized enterprise systems and those without extensive and standardized information systems?

Conclusion

This dissertation seeks to contribute to the emerging debate on the value created by the significant investments by firms in information technologies that some estimates suggest account for over 30% of firms' capital investments in the past decade (Bureau of Economic Analysis 2014). In particular, we witness firms moving from customized software to supporting business processes and decision making by implementing Enterprise Systems that typically involve multi-year, multi-million dollar commitments for the transition. While these complex projects are disruptive to operations and often result in performance dips in the short and medium term (McAfee 1992), these projects have been justified based on the future benefits from coordinating and integrating business processes across enterprises; improving coordination and integration of resources across multiple functional and business units in the firm; the provision of real-time, accurate enterprise wide information for managers; as well as superior analytical tools and collaboration capabilities for decision making.

However, there is a lack of large-scale empirical studies of the value of the benefits from these complex systems. We are also not aware of any a large scale empirical examinations of the relationship of superior resource coordination and information provision capabilities provided by Enterprise Systems to the important managerial decisions regarding changes to the boundaries of the firm through mergers and acquisitions. Even in practice, the role that information technologies can play in regard to merger and acquisitions is currently under-appreciated, as suggested by

observations that fewer than 25% of firms involved the CIO in deliberations and decision processes for M&A initiatives (Yetton et. al 2013).

Therefore, the results from this dissertation contribute theoretically and empirically to research in the IS field and also hold practical value. The first chapter of my dissertation reveals that ERP systems have a positive relationship with horizontal and conglomerate M&A as ERP systems can reduce internal coordination costs associated with operating a larger firm. The empirical analysis also indicates that this effect is stronger if the potential acquirer is larger. It also reveals that CRM (SCM) systems have a negative relationship with vertical M&A as CRM (SCM) systems can reduce the cost associated with coordinating with customers (suppliers), and thus CRM (SCM) systems allow firms to use information based coordination with customers (suppliers). The analysis also indicates that if the downstream industry is very unpredictable and dynamic that increases external coordination costs, then CRM systems facilitate ownership-based coordination by reducing the internal coordination cost associated with operating an integrated network of downstream partners. Similarly, if the supplier industry is concentrated i.e., suppliers have market power that increases external coordination costs, then SCM systems are associated with more vertical M&A as SCM systems can reduce the internal coordination cost of operating a more integrated supply chain network; thus enabling ownership-based coordination.

The second chapter of the dissertation highlights that the value realized by shareholders when they are acquired are positively associated with enterprise system extensiveness and standardization of the target firm. This is an interesting finding that,

even for relatively smaller firms, it is important for them to invest in creating an information infrastructure across their business through enterprise systems and ensure that it is standardized. On the acquirer side, the extensiveness and standardization of enterprise systems are negatively related to acquisitions. This suggests that firms with extensive and standardized enterprise systems prefer to use information based coordination with partners, rather than acquiring them. However, if they do make an acquisition, they have lower cost of integration compared to an average acquirer as they can "rip and replace" the information systems of the target with their own enterprise systems. This is one of the reasons that the market responds positively to acquisitions by such acquirers. However, in contrast to the acquirers, the targets with extensive and standardized enterprise systems are more likely to be acquired. This may mean that even when acquirers expect to rip and replace the targets enterprise systems (if any), acquirers value the target having gone through the process of implementing an extensive and standardized enterprise system as such targets are better prepared to implement the acquirers enterprise systems. It is also possible that many acquirers are acquiring targets with extensive and standardized enterprise systems as they may replace their own systems with the extensive and standardized systems of the target firm.

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Appendix

Table 1: Theoretical Arguments for the Impact of ERP, CRM and SCM Systems

(Column 1)	ERP System (Column 2)	CRM System (Column 3)	SCM System (Column 4)
AGENCY THEORY: INTERNAL COORDINATION COSTS			
Agency costs • Monitoring costs • Bonding costs • Residual loss	DECREASED. • Reduces the number of agents in back-office (lower monitoring cost); • Eases the process of recording and reporting to management (lowering bonding cost).	DECREASED. • Makes assessment of individual salesperson's and customer service employees performance easier (lower monitoring costs); • Enables firms to evaluate individual marketing programs (lower monitoring costs).	DECREASED. • Helps to share demand, production planning, and inventory information in real time so that the firm can monitor that procurement, production, and delivery are as scheduled.
Decision information costs • Information processing costs to relocate information • Opportunity costs of poor or delayed information	DECREASED. • Data standardization and cross-functional data flow provide real-time and consistent information that reduces errors and ambiguity (lower information processing and opportunity costs).	DECREASED. • Critical information is delivered to sales and customer service employees in a timely manner (lower information processing costs); • Delivers timely information to support better decision making (lower opportunity cost).	DECREASED. • Increases visibility in the supply chain so that the firm can adapt to any changes in the supply chain in an efficient manner.
TRANSACTION COST ECONOMICS: EXTERNAL COORDINATION COSTS/MARKET TRANSACTION COSTS			
Costs of coordination • The cost of exchanging information on products (price, product characteristics, and availability) • The cost incurred by the firm due to delays in the communication channel		DECREASED. • The sale process (ordering, tracking, product configuration and pricing, etc.) is automated and simplified; • Sales employees are well informed for the interaction with customers.	DECREASED. • Reduces the cost of exchanging information with suppliers because of automated procurement and settlement processes; • The chance of delays and miscommunication is minimized due to electronic procurement and payment systems.
Costs of transaction risk ○ Information asymmetries ○ Differences in bargaining power ○ Incomplete or unenforceable contracts ○ Relationship-specific investments ○ Number of potential suppliers ○ Loss of resource control		DECREASED. • Customer service employees have real-time information to take action and conduct intelligent interactions with customers; • Easier to assesses the performance of partners through evaluation of sales, service, and marketing activities conducted with partners.	DECREASED. • Contract management reduces cost of monitoring and enforcing contracts with suppliers; • Monitors and tracks supply chain performance and thus reduces the risk of shirking.

Table 3: Descriptive Statistics and Correlations

	Mean	Std. Dev.	1	2	3	4	5	6	7	8	9
Dependent Variables											
1 # of horizontal M&A	0.189	0.82	1.00 *								
2 # of pure vertical M&A, 1%	0.107	0.44	0.40 *	1.00							
3 # of conglomerate M&A, 1%	0.202	0.68	0.11 *	0.13 *	1.00						
Independent Variables											
4 ERP system	0.04	1.57	0.03	0.03	0.03 *	1.00					
5 CRM system	0.12	0.22	0.04 *	0.03 *	0.01	0.61 *	1.00				
6 SCM system	0.14	0.23	0.03	0.01	0.00	0.67 *	0.66 *	1.00			
7 Standardized # of employees	0.00	1.00	0.00	0.03 *	0.14 *	-0.02	-0.01	0.01	1.00		
8 Dynamism	1.03	0.04	0.00	0.03	0.01	-0.02	-0.03 *	-0.04 *	-0.01	1.00	
9 Supplier industry concentration	26.84	47.53	-0.03	0.02	0.07 *	0.01	0.00	0.04 *	0.00	0.14 *	1.00
Control Variables											
10 Prop. of IT employees in total employees	0.11	0.28	0.01	0.00	-0.02	-0.01	0.00	-0.01	-0.01	-0.02	-0.03 *
11 PC per employee	0.74	0.45	0.01	0.01	-0.02	0.05 *	0.04 *	0.01	-0.04 *	-0.02	-0.04 *
12 Server per employee	0.10	0.08	0.01	0.01	-0.01	-0.02	0.04 *	0.01	-0.02	-0.02	0.01
13 Vertical integration	0.04	0.05	0.12 *	0.13 *	-0.04 *	0.04 *	0.04 *	0.03	-0.08 *	0.09 *	0.09 *
14 Diversification, unrelated	0.21	0.33	-0.07 *	0.02	0.14 *	0.06 *	0.02	0.03	0.03	0.06 *	0.08 *
15 Diversification, related	0.14	0.26	-0.03	0.01	0.08 *	0.04 *	0.02	0.01	0.06 *	0.07 *	0.15 *
16 Focal firm slack	0.08	0.09	-0.03	-0.04 *	0.02	-0.01	0.01	0.02	-0.03 *	0.05 *	0.07 *
17 Focal firm performance	0.02	0.66	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.00
18 Focal industry concentration	393	470	-0.06 *	-0.02	0.07 *	0.05 *	0.04 *	0.08 *	0.16 *	0.15 *	0.42 *
19 Focal firm industry # of M&A	1387	2151	0.09 *	0.00	-0.04 *	0.02	0.03	0.01	-0.05 *	-0.20 *	-0.12 *
20 Munificence	1.03	0.16	0.00	-0.01	0.02	0.01	0.00	0.01	0.04 *	0.39 *	0.07 *

Note: * p<0.5

Table 4: Baseline Model: Negative Binomial Regression, 2009-2014

Number of M&A / Indep. Vars.	Horizontal	0% Cutoff		1% Cutoff		5% Cutoff	
		Pure Vertical	Conglomerate	Pure Vertical	Conglomerate	Pure Vertical	Conglomerate
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ERP system	0.0722	0.0898	0.146	0.0615	0.120*	0.013	0.108**
	(0.05)	(0.06)	(0.11)	(0.07)	(0.06)	(0.11)	(0.05)
ERP * standardized # of employees	0.153	0.0396	0.178**	0.0221	0.0826	-0.0774	0.083
	(0.11)	(0.09)	(0.08)	(0.06)	(0.10)	(0.10)	(0.08)
CRM system	-37.63***	-24.23***	-14.51	-30.57***	-18.87*	-28.15**	-28.38***
	(9.73)	(7.19)	(11.61)	(8.67)	(10.91)	(11.06)	(7.97)
CRM * dynamism	36.51***	23.92***	13.56	30.09***	18.55*	29.48***	27.60***
	(9.39)	(6.96)	(11.35)	(8.26)	(10.62)	(10.57)	(7.74)
SCM system	-0.141	-1.101***	-1.05	-1.123**	-1.069***	-2.731***	-0.903***
	(0.47)	(0.34)	(0.74)	(0.54)	(0.38)	(0.91)	(0.33)
SCM * supplier industry concentration	-0.0091	0.00850**	0.0179**	0.0107*	0.00936**	0.0204**	0.00856*
	(0.01)	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)	(0.00)
Standardized # of employees	0.121	0.302	0.0912	0.118*	0.345	0.0716	0.305
	(0.10)	(0.20)	(0.09)	(0.07)	(0.22)	(0.10)	(0.19)
Dynamism	-5.948*	-0.731	4.835*	-0.815	0.573	-4.474	0.387
	(3.35)	(2.02)	(2.54)	(2.81)	(2.09)	(4.43)	(1.82)
Supplier industry concentration	0.00235	0.00267	-0.00568	0.00219	0.00157	0.00449	0.00172
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Prop. of IT employees in total employees	-0.232	-0.309	-4.089*	-0.0423	-0.918**	0.349	-0.727**
	(0.32)	(0.26)	(2.35)	(0.31)	(0.41)	(0.43)	(0.29)
PC per employee	0.226	0.133	-0.33	0.251	0.0256	0.345	0.0618
	(0.24)	(0.17)	(0.53)	(0.19)	(0.20)	(0.27)	(0.17)
Server per employee	-1.919	-0.461	-1.665	-1.026	-0.414	-1.308	-0.325
	(1.45)	(0.97)	(2.70)	(0.99)	(1.04)	(1.45)	(0.92)
Focal industry concentration	-0.000291	-0.000231	0.0000349	-0.000458**	-0.00000593	-0.000651	-0.000138
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Munificence	1.306*	0.0531	0.527	0.635	0.0712	1.867	0.0781
	(0.71)	(0.58)	(0.82)	(0.74)	(0.59)	(1.16)	(0.53)
Vertical integration	4.145*	2.505*	-18.01***	4.276**	-2.105	6.637***	0.322
	(2.22)	(1.42)	(4.26)	(1.66)	(1.49)	(1.91)	(1.34)
Diversification, unrelated	-0.756***	0.804***	1.077***	0.619***	0.902***	0.53	0.864***
	(0.26)	(0.19)	(0.29)	(0.21)	(0.22)	(0.40)	(0.19)
Diversification, related	-0.315	0.367	1.498***	0.0912	0.706**	-0.534	0.621**
	(0.30)	(0.25)	(0.36)	(0.29)	(0.28)	(0.45)	(0.24)
Focal firm slack	-1.849**	-0.493	-1.018	-2.051***	0.291	-3.485***	-0.286
	(0.88)	(0.61)	(1.13)	(0.73)	(0.70)	(1.28)	(0.61)
Focal firm performance	2.478***	3.231**	5.959***	2.707***	3.763**	2.773*	3.525***
	(0.81)	(1.27)	(1.29)	(0.98)	(1.49)	(1.47)	(1.28)
Focal firm ind # of M&A	0.000153***	7.33e-05**	-0.0000141	0.0000673	6.32e-05*	-0.00000444	7.36e-05**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	3.059	-1.257	-8.227***	-2.538	-2.795	-1.837	-2.274
	(3.05)	(1.80)	(2.41)	(2.46)	(1.93)	(4.04)	(1.69)
Observations	3208	3208	3208	3208	3208	3208	3208
Wald Chi-square	154.6	113.1	146.1	109	108.1	149.1	128.7
Prob > chi-square	0.00	0.00	0.00	0.00	0.00	0.00	0.00

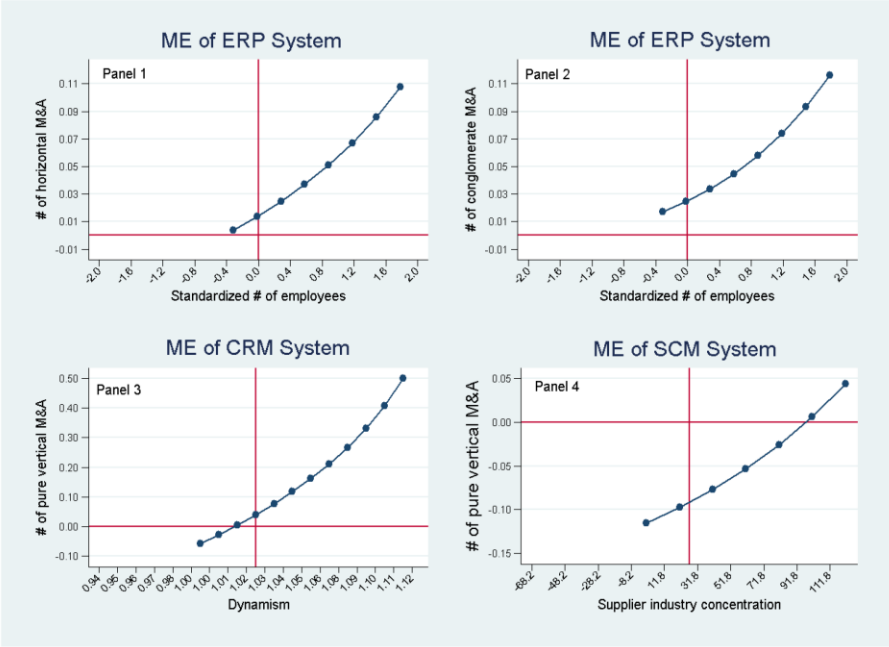
Note: Robust standard errors clustered over firm are in parentheses.* Significant at 10%; ** significant at 5%; *** significant at 1%.

Table 5: Marginal Effects of ERP, CRM and SCM Systems in the Baseline Model, at -1 SD, the Mean and 1 SD of the Moderators

	Indep. Vars.	ERP System			CRM System			SCM System		
	Dep. Vars.	Horizontal	Pure Vertical [2]	Conglomerate [3]	Horizontal	Pure Vertical	Conglomerate	Horizontal	Pure Vertical	Conglomerate
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ME of ERP system: standardized # of employees at -1 SD 1 ME of CRM system: dynamism at -1 SD ME of SCM system: supplier ind concentration at -1 SD	**Marginal Effect**	**-0.016**	**0.003**	**0.004**	**-0.394**	**-0.104**	**-0.118**	**0.030**	**-0.129**	**-0.216**
	Delta-method SE	0.018	0.009	0.014	0.174	0.083	0.103	0.115	0.069	0.091
ME of ERP system: standardized # of employees at the mean ME of CRM system: dynamism at the mean ME of SCM system: supplier ind concentration at the mean	**Marginal Effect**	**0.014**	**0.007**	**0.024**	**-0.022**	**0.042**	**0.031**	**-0.062**	**-0.091**	**-0.154**
	Delta-method SE	0.011	0.008	0.014	0.075	0.061	0.067	0.088	0.062	0.079
ME of ERP system: standardized # of employees at 1 SD ME of CRM system: dynamism at 1 SD ME of SCM system: supplier ind concentration at 1 SD	**Marginal Effect**	**0.056**	**0.011**	**0.062**	**0.306**	**0.236**	**0.223**	**-0.165**	**-0.037**	**-0.071**
	Delta-method SE	0.042	0.014	0.048	0.113	0.083	0.157	0.137	0.077	0.098

Note: 1. Except the moderator specified, all the other variables are set at the mean level. 2. at 1% level. 3. at 1% level.

Figure 1: The Marginal Effects of ERP, CRM and SCM Systems on the Number of Horizontal, Pure Vertical and Conglomerate M&A, Evaluated at Different Levels of Moderators



Note: Panel 1 and panel 2 show the ME of ERP system on horizontal and conglomerate M&A at different levels of standardized number of employees (the range goes from -2 SD to 2 SD on the x axis; however, we only plot the ME when the moderator is within the range of our sample). Panel 3 and panel 4 show the ME of CRM and SCM system on pure vertical M&A, evaluated at different values of dynamism and supplier industry concentration (also the range goes from -2 SD to 2 SD on the x axis; but we only plot the ME when the moderator is within the range of our sample). The vertical line shown in the middle of each graph indicates the mean of the moderator. The horizontal line in each graph shows the value zero of ME.

Table 6: First-stage OLS Results of Poisson Regression with Instrumental Variables

Number of M&A / Indep. Vars.	ERP System (1)	CRM System (2)	SCM System (3)
IT-EMPLOYMENT	-0.185	-0.159	0.137
	(1.22)	(0.21)	(0.20)
IT-SALARY	0.0171	0.0604	-0.168
	(0.81)	(0.11)	(0.11)
IT-EMPLOYMENT * supplier ind concentration	-0.00377***	-0.000144	-0.000223*
	(0.00)	(0.00)	(0.00)
IT-SALARY * supplier ind concentration	0.0014	0.0000775	-0.000107
	(0.00)	(0.00)	(0.00)
IT-EMPLOYMENT * dynamism	0.213	0.152	-0.142
	(1.19)	(0.21)	(0.20)
IT-SALARY * dynamism	-0.0721	-0.0597	0.17
	(0.78)	(0.10)	(0.11)
IT-EMPLOYMENT * standardized # of employees	-0.113*	-0.0232***	-0.0243***
	(0.06)	(0.01)	(0.01)
IT-SALARY * standardized # of employees	0.0402	0.0118**	0.00950*
	(0.04)	(0.01)	(0.01)
MSA-IND-ERP	1.241***	0.0140**	0.0134*
	(0.05)	(0.01)	(0.01)
MSA-IND-CRM	-6.312	0.112	-1.287
	(10.04)	(1.64)	(1.50)
MSA-IND-SCM	-1.026***	-0.196***	0.828***
	(0.33)	(0.05)	(0.06)
MSA-IND-ERP * standardized # of employees	-0.0033	-0.000133	0.00152
	(0.03)	(0.00)	(0.01)
MSA-IND-CRM * dynamism	7.064	0.919	1.314
	(9.79)	(1.60)	(1.46)
MSA-IND-SCM * supplier ind concentration	0.0178***	0.00244***	0.00261***
	(0.01)	(0.00)	(0.00)
Standardized # of employees	-0.0508*	-0.0043	-0.00656**
	(0.03)	(0.00)	(0.00)
Dynamism	-0.294	-0.111	-0.349**
	(1.13)	(0.16)	(0.16)
Supplier ind concentration	-0.00343***	-0.000311**	-0.000203
	(0.00)	(0.00)	(0.00)
Prop. of IT employees in total employees	-0.305**	-0.0205	-0.0344
	(0.15)	(0.02)	(0.02)
PC per employee	0.0375	-0.0133	-0.0201
	(0.10)	(0.01)	(0.01)
Server per employee	-0.1	0.123*	0.163**
	(0.42)	(0.07)	(0.07)
Focal industry concentration	0.000199***	2.53e-05***	2.61e-05***
	(0.00)	(0.00)	(0.00)
Munificence	-0.527**	-0.0442	-0.0279
	(0.23)	(0.03)	(0.03)
Vertical integration	0.687	0.101	0.166**
	(0.44)	(0.07)	(0.07)
Diversification, unrelated	0.257***	0.0192**	0.0107
	(0.07)	(0.01)	(0.01)
Diversification, related	0.144*	-0.00245	-0.0187
	(0.08)	(0.01)	(0.01)
Focal firm slack	-0.14	-0.0258	0.0148
	(0.23)	(0.04)	(0.04)
Focal firm performance	0.0247	-0.0900**	-0.0551
	(0.22)	(0.04)	(0.04)
Focal firm ind # of M&A	0.0000169	0.00000085	-0.00000101
	(0.00)	(0.00)	(0.00)
Year dummies	Yes	Yes	Yes
Constant	0.227	0.147	0.369**
	(1.14)	(0.17)	(0.16)
Observations	3224	3224	3224
R-squared	0.356	0.327	0.35
F-statistic	100.65	55.11	59.56

Note: Stock and Yogo (2005) critical value is 9.53 (for relative bias >5%). Stock and Yogo (2005) critical value is calculated for models without moderators . Robust standard errors are in parentheses.* Significant at 10%; ** significant at 5%; *** significant at 1%.

Table 7: Poisson Models with Instrumental Variables, 2009-2014

Number of M&A / Indep. Vars.	Horizontal	0% Cutoff		1% Cutoff		5% Cutoff	
		Pure Vertical	Conglomerate	Pure Vertical	Conglomerate	Pure Vertical	Conglomerate
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ERP system	-0.0353	-0.153	0.314*	-0.118	-0.0576	-0.0655	-0.0934
	(0.13)	(0.10)	(0.19)	(0.13)	(0.12)	(0.23)	(0.10)
ERP * standardized # of employees	0.0980**	0.00562	0.148***	0.0104	0.0264	-0.0577	0.029
	(0.04)	(0.07)	(0.05)	(0.04)	(0.08)	(0.09)	(0.06)
CRM system	-55.40***	-35.32***	-18.31**	-42.81***	-17.61	-34.77***	-35.38***
	(7.80)	(9.15)	(9.13)	(7.85)	(12.89)	(11.64)	(10.62)
CRM * dynamism	53.81***	36.20***	16.70*	42.10***	18.98	35.68***	35.74***
	(7.24)	(9.03)	(9.03)	(7.38)	(12.66)	(11.17)	(10.43)
SCM system	-0.217	-1.040*	-0.823	0.12	-1.640**	-0.736	-0.999*
	(0.59)	(0.57)	(1.16)	(0.73)	(0.67)	(1.04)	(0.57)
SCM * supplier industry concentration	-0.00981	0.00803*	0.0176**	0.00919	0.00968*	0.0181***	0.00776
	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Standardized # of employees	0.0929*	0.0029	-0.00587	0.0962**	0.127**	0.0865	0.125**
	(0.05)	(0.00)	(0.00)	(0.04)	(0.06)	(0.08)	(0.05)
Dynamism	-9.553**	-3.091	4.134**	-2.159	-0.624	-4.411	-1.42
	(3.88)	(2.62)	(2.11)	(3.10)	(2.40)	(4.83)	(2.27)
Supplier industry concentration	0.00217	-0.133	0.235	0.00278	0.00189	0.00588	0.00171
	(0.00)	(0.70)	(0.61)	(0.00)	(0.00)	(0.00)	(0.00)
Prop. of IT employees in total employees	-0.177	0.194	-0.312	-0.0261	-0.964**	0.391	-0.709**
	(0.28)	(0.16)	(0.56)	(0.29)	(0.45)	(0.45)	(0.31)
PC per employee	0.254	-0.775	-2.075	0.199	0.129	0.135	0.164
	(0.25)	(0.85)	(3.34)	(0.20)	(0.22)	(0.34)	(0.17)
Server per employee	-1.321	-0.319	-4.181	-0.75	-0.686	-0.498	-0.736
	(1.45)	(0.26)	(2.58)	(1.02)	(1.13)	(1.84)	(0.89)
Focal industry concentration	-0.000399*	-0.000132	-0.0000855	-0.000526**	0.0000677	-0.000922	-0.0000329
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Munificence	1.818**	1.886	-19.03***	0.659	-0.0718	1.897	-0.0825
	(0.91)	(1.20)	(4.46)	(0.88)	(0.65)	(1.29)	(0.59)
Vertical integration	4.468**	0.889***	1.096***	3.964***	-2.633*	6.167***	-0.136
	(1.85)	(0.21)	(0.29)	(1.24)	(1.52)	(1.50)	(1.32)
Diversification, unrelated	-0.908***	0.378	1.643***	0.537**	1.090***	0.45	0.978***
	(0.33)	(0.27)	(0.34)	(0.23)	(0.24)	(0.49)	(0.20)
Diversification, related	-0.234	0.118**	0.0888	0.0848	0.785***	-0.361	0.624**
	(0.40)	(0.06)	(0.06)	(0.28)	(0.30)	(0.48)	(0.26)
Focal firm slack	-1.549*	-0.79	-0.945	-2.054***	-0.255	-3.575***	-0.6
	(0.94)	(0.57)	(1.09)	(0.71)	(0.68)	(1.36)	(0.56)
Focal firm performance	2.003***	3.342***	6.016***	2.466***	4.051***	2.623*	3.612***
	(0.63)	(1.01)	(1.09)	(0.80)	(1.16)	(1.36)	(0.97)
Focal firm ind # of M&A	0.000147***	7.29e-05**	-0.000000029	0.0000716	6.08e-05*	0.00000606	7.36e-05**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Residual, ERP	0.126	0.263***	-0.248	0.192	0.181	0.0211	0.210**
	(0.15)	(0.10)	(0.20)	(0.13)	(0.12)	(0.25)	(0.11)
Residual, CRM	-0.133	-1.960**	1.096	0.0315	-2.340**	0.315	-1.776**
	(1.05)	(0.87)	(1.24)	(0.91)	(1.00)	(1.41)	(0.86)
Residual, SCM	0.291	0.141	-0.169	-1.400*	0.899	-1.938*	0.409
	(0.73)	(0.68)	(1.28)	(0.72)	(0.79)	(1.11)	(0.68)
Constant	6.175*	1.175	-7.205***	-1.267	-1.605	-2.021	-0.419
	(3.50)	(2.37)	(1.86)	(2.69)	(2.11)	(4.54)	(2.05)
Observations	3208	3208	3208	3208	3208	3208	3208
Wald Chi-square	810.6	123.8	229.1	269.4	113.3	241.0	131.1
Prob > chi-square	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Note: Robust standard errors clustered over firm are in parentheses.* Significant at 10%; ** significant at 5%; *** significant at 1%.

Table 8: The Impact of ERP Systems on Horizontal and Conglomerate M&A, DID Analysis

Models	Linear Panel Model with Firm Fixed Effects		Linear Panel Model with Matched Pair Fixed Effects		Pooled Poisson Model	
Number of M&A / Indep. Vars.	Horizontal	Conglomerate 1%	Horizontal	Conglomerate 1%	Horizontal	Conglomerate 1%
	(1)	(2)	(3)	(4)	(5)	(6)
Treated (ERP system)			0.280	-0.329	0.751	-3.067
			(0.43)	(0.54)	(1.40)	(2.00)
Treated * std # employee	5.483**	7.183***	0.996	-0.839	-2.447	-15.04*
	(2.34)	(1.76)	(1.72)	(2.49)	(6.13)	(7.69)
After	0.212	-0.0637	-0.359	-0.779*	-3.967	-4.666***
	(0.31)	(0.24)	(0.48)	(0.34)	(2.96)	(1.36)
After * std # employee	0.12	-0.805	-2.616	-2.983	-20.92*	-20.68***
	(2.10)	(1.88)	(2.39)	(2.54)	(12.59)	(7.42)
Treated * After	-0.067	-0.142	0.0444	0.447	3.807	3.001*
	(0.43)	(0.32)	(0.61)	(0.41)	(2.94)	(1.61)
Treated * After * std # employee	0.312	0.738	2.55	2.962	20.76*	19.76***
	(2.08)	(1.90)	(2.36)	(2.58)	(12.58)	(7.03)
Standardized # of employees	-3.834	-7.438***	-0.817	0.741	2.667	14.30*
	(2.37)	(1.70)	(1.72)	(2.46)	(6.12)	(7.56)
Dynamism	8.198*	-7.438	9.255*	-1.882	11.18*	-14.7
	(4.70)	(4.50)	(3.85)	(5.32)	(6.22)	(17.97)
Supplier industry concentration	-0.0161*	0.0178	-0.00892***	-0.00613**	-0.0118	-0.00827
	(0.01)	(0.02)	(0.00)	(0.00)	(0.01)	(0.01)
Prop. of IT employees in total employees	0.0248	-0.0732	-0.174***	-0.188	-1.316**	-2.592
	(0.06)	(0.11)	(0.05)	(0.14)	(0.61)	(2.43)
PC per employee	-0.0117	0.0624	0.0835	0.0682	0.403	0.636
	(0.10)	(0.10)	(0.10)	(0.14)	(0.30)	(0.58)
Server per employee	0.264	-0.556	-0.0593	-0.282	-0.697	-1.355
	(0.57)	(0.47)	(0.41)	(0.34)	(1.42)	(1.59)
Focal industry concentration			-0.00297**	-0.00152	0.0011	-0.000505
			(0.00)	(0.00)	(0.00)	(0.00)
Munificence	0.773	-0.739	0.641	-0.375	0.656	-0.298
	(0.92)	(0.85)	(0.79)	(0.55)	(2.95)	(2.37)
Vertical integration	-7.736	0.799	5.266	-3.259*	5.574	-2.077
	(7.19)	(2.89)	(2.92)	(1.39)	(5.99)	(5.62)
Diversification, unrelated	-0.31	0.833*	-0.206	0.723*	-0.857	0.454
	(0.69)	(0.43)	(0.22)	(0.36)	(0.94)	(0.95)
Diversification, related	0.0479	-0.39	0.319*	0.471*	-0.914	0.686
	(1.42)	(1.03)	(0.15)	(0.22)	(1.47)	(0.92)
Focal firm slack	-2.47	-0.902	3.821**	3.271	1.49	3.553
	(2.56)	(2.27)	(1.15)	(1.91)	(2.76)	(3.67)
Focal firm performance	-0.277	-0.457	-2	-0.2	-3.559	-3.224
	(1.54)	(0.86)	(2.01)	(1.44)	(2.29)	(4.91)
Focal firm ind # of M&A	0.000261***	0.00000123	0.000277**	-0.00000116	0.000145	0.0000241
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-8.63	7.32	-7.388	3.795	-14.13*	17.43
	(5.14)	(4.79)	(4.31)	(5.73)	(7.88)	(19.51)
Observations	158	158	158	158	158	158
R square	0.20	0.10	0.32	0.25		

* Significant at 10%; ** significant at 5%; *** significant at 1%.

Table 9: The Impact of CRM and SCM Systems on Pure Vertical M&A, DID Analysis

	DD Analysis on CRM System			DD Analysis on SCM System		
Models / Indep. Vars.	Linear Panel Model with Firm Fixed Effects	Linear Panel Model with Matched Pair Fixed Effects	Pooled Poisson Model	Linear Panel Model with Firm Fixed Effects	Linear Panel Model with Matched Pair Fixed Effects	Pooled Poisson Model
	(1)	(2)	(3)	(4)	(5)	(6)
Treated (CRM system)		-0.0508	-4.184			
		(2.95)	(27.81)			
Treated * dynamism	1.079	0.197	5.122			
	(3.31)	(2.82)	(27.03)			
After	5.436	10.88*	349.2***			
	(4.25)	(5.55)	(135.20)			
After * dynamism	-5.461	-10.60*	-349.2***			
	(4.18)	(5.26)	(134.40)			
Treated * After	-19.34**	-12.94*	-370.7***			
	(9.60)	(6.83)	(136.10)			
Treated * After * dynamism	19.11**	12.76*	370.1***			
	(9.45)	(6.61)	(135.20)			
Treated (SCM system)					0.0580	0.67
					(0.21)	(0.89)
Treated * sup ind concentration				0.00391	0.00506	0.014
				(0.01)	(0.01)	(0.02)
After				-0.254*	-0.031	-0.246
				(0.14)	(0.25)	(0.83)
After * sup ind concentration				0.00366***	0.00435**	0.0179***
				(0.00)	(0.00)	(0.01)
Treated * After				0.196	0.0844	-0.305
				(0.15)	(0.21)	(1.06)
Treated * After * sup ind concentration				-0.00761*	-0.0065	-0.0254
				(0.00)	(0.00)	(0.02)
Standardized # of employees	0.292	-0.0788	-0.0169	-0.498**	0.0113	-0.0798
	(0.23)	(0.07)	(0.12)	(0.21)	(0.09)	(0.29)
Dynamism	1.224	-1.471	-11.59	-5.460**	-4.204	-12.57
	(1.58)	(2.58)	(23.00)	(2.20)	(2.40)	(9.59)
Supplier industry concentration		-0.000941	-0.011		-0.00656*	-0.0125*
		(0.00)	(0.01)		(0.00)	(0.01)
Prop. of IT employees in total employees	0.15	0.204	0.649	-0.153	-0.145	0.357
	(0.14)	(0.32)	(0.78)	(0.09)	(0.17)	(0.76)
PC per employee	0.0559	0.0346	0.062	-0.0815	-0.056	-0.19
	(0.10)	(0.07)	(0.23)	(0.08)	(0.13)	(0.58)
Server per employee	0.119	0.122	0.668	1.344***	0.819	-3.392
	(0.25)	(0.24)	(1.38)	(0.38)	(0.83)	(3.60)
Focal industry concentration		0.000147	-0.000211		-0.000274	0.00117*
		(0.00)	(0.00)		(0.00)	(0.00)
Munificence	-0.391	-0.789	-3.458	-0.159	-1.075	-0.849
	(0.56)	(0.51)	(4.15)	(0.50)	(0.64)	(2.94)
Vertical integration	0.184	-1.738	-12.23**	-5.295**	-4.438	-1.792
	(2.43)	(3.07)	(5.71)	(2.42)	(2.62)	(7.67)
Diversification, unrelated	-0.00299	0.0016	0.0165	0.213	-0.355	1.312*
	(0.02)	(0.01)	(0.04)	(0.34)	(0.32)	(0.79)
Diversification, related	0.0181	-0.0721	-0.341	0.455	-0.472	1.033
	(0.26)	(0.13)	(0.70)	(0.50)	(0.49)	(1.37)
Focal firm slack	-0.32	-0.374*	-4.083**	-1.403	-0.601	-3.242
	(0.38)	(0.18)	(1.63)	(1.44)	(0.92)	(4.17)
Focal firm performance	-0.205	-0.0726	-0.799	0.254*	0.00961	0.646
	(0.32)	(0.39)	(0.85)	(0.14)	(0.33)	(3.00)
Focal firm ind # of M&A	0.0000299	0.0000183	0.000143	0.0000699	0.0000209	-0.0000645
	-0.0000303	-0.0000355	-0.000164	-0.0000454	-0.0000479	-0.000177
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-3.439	2.342	13.96	6.149**	7.104*	11.88
	(2.57)	(2.96)	(25.95)	(2.42)	(3.59)	(10.50)
Observations	358	358	358	161	161	161
R square	0.05	0.16		0.15	0.23	

* Significant at 10%; ** significant at 5%; *** significant at 1%.

Table 10: Descriptive Statistics for the Acquirer Sample

	N	Mean	Std. Dev.	Min	Max
Dependent Vars					
Premium: stock price 4 week prior	407	52.75	91.45	-91.18	1150
CAR_runup (-63, -1)	2770	0.00	0.21	-1.41	1.24
CAR_markup (0, 126)	2770	-0.03	0.36	-2.60	3.07
CAR_prem (-63, 126)	2770	-0.03	0.47	-3.61	3.47
CAR (-2, 2)	1,977	0.01	0.12	-0.45	3.67
Independent Vars					
Acquirer EIS extensiveness	4,852	0.56	2.01	-0.88	6.43
Acquirer EIS standardization	3113	-0.77	0.64	-2.63	0.00
Control Vars					
Hostile	4,935	1%	8%	0.00	1.00
Tender_offer	4,935	2%	13%	0.00	1.00
Toehold	4,935	3%	18%	0.00	1.00
Number of competitors	4,935	0.01	0.11	0.00	2.00
Merger_of_equal	4,935	0%	3%	0.00	1.00
ROE	4,666	0.05	0.70	-25.44	21.57
Market to book ratio	4,575	1.53	37.26	-1922.31	96.13
Log(Acquirer market capitalization)	4,085	14.48	1.89	8.65	20.28
Vertical relatedness index	4,449	0.03	0.06	0.00	0.66
Horizontal complimentarity coefficient	4,449	0.60	0.37	-0.01	1.00
Anchoring effect	4,272	53.28	171.93	-99.53	7617
Acquirer advisor average premium: 3 years prior	935	42.45	25.88	-85.57	339
Acquirer selection CAR	3,670	0.02	1.02	-8.55	6.02

Table 11: Correlation Matrix for the Acquirer Sample

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	Premium: stock price 4 week prior	1																		
2	CAR_runup (-63, -1)	0.0319	1																	
3	CAR_markup (0, 126)	-0.1513*	0.3785*	1																
4	CAR_prem (-63, 126)	-0.0985	0.7189*	0.9155*	1															
5	CAR (-2, 2)	-0.1751*	0.0353	0.3146*	0.2535*	1														
6	Acquirer EIS extensiveness	-0.044	0.0183	0.0184	0.0218	0.0041	1													
7	Acquirer EIS standardization	-0.0498	0.0081	-0.0208	-0.012	-0.0597*	0.0102	1												
8	Hostile	0.0058	-0.0026	0.0086	0.0053	-0.0062	-0.0262	0.0061	1											
9	Tender_offer	0.0135	-0.0056	-0.0142	-0.0131	0.0123	-0.0093	-0.0373*	0.2742*	1										
10	Toehold	-0.0853	0.0289	0.0037	0.0153	-0.0107	-0.0392*	-0.0382*	0.0512*	0.0555*	1									
11	Number of competitors	0.0582	0.0001	-0.0087	-0.0065	-0.0068	-0.0257	0.0021	0.2496*	0.1862*	0.0022	1								
12	Merger_of_equal	-0.0351	-0.0028	-0.0184	-0.0151	0	-0.0172	0.0169	-0.0027	-0.0041	-0.0059	0.1102*	1							
13	ROE	0.1021*	-0.0273	-0.0266	-0.0319	-0.0460*	0.0054	-0.0313	-0.0105	-0.0015	0.0114	-0.0004	-0.0046	1						
14	Market to book ratio	-0.003	-0.0811*	-0.0286	-0.0567*	0.0189	-0.0141	-0.0103	0.0025	0.0047	0.001	0.0068	-0.0003	-0.3277*	1					
15	Log(Acquirer market capitalization)	-0.0765	0.0183	0.0348	0.0341	-0.0338	0.0859*	-0.3361*	0.0043	0.0740*	0.0409*	0.0378*	-0.0098	0.0384*	0.022	1				
16	Vertical relatedness index	0.0006	0.0035	0.0383	0.0304	0.0163	-0.0287	0.0164	-0.0169	0.0086	0.0413*	0.0241	-0.0082	-0.0082	0	0.0827*	1			
17	Horizontal complimentarity coefficient	-0.0211	-0.0287	0.0337	0.0131	0.0153	-0.0565*	0.1247*	0.0340*	0.0292	0.0014	0.0596*	0.0238	-0.0046	0.0047	-0.0665*	0.3000*	1		
18	Anchoring effect	-0.0062	0.0329	0.0205	0.0299	-0.018	0.0255	0.0022	0.0054	-0.0051	-0.0128	-0.008	-0.0044	0.0004	0.0016	-0.0129	-0.0304	-0.0464*	1	
19	Acquirer advisor average premium: 3 years prior	-0.1099	0.0114	0.0523	0.0462	0.0146	-0.0173	0.0889*	0.0311	-0.0336	-0.0594	-0.0268	-0.0097	-0.0152	0.0209	-0.1337*	-0.0416	-0.042	0.0056	1
20	Selection CAR	0.0739	-0.0732*	-0.1536*	-0.1473*	-0.0039	-0.0154	-0.0157	0.0122	-0.0087	-0.0177	0.0283	-0.0162	-0.0288	0.0053	-0.0274	-0.0332	-0.022	-0.007	-0.07

* significantly correlated at 0.05 level.

Table 12: Descriptive Statistics for the Target Sample

	N	Mean	Std. Dev.	Min	Max
Dependent Vars					
Premium: stock price 4 week prior	655	41.98	60.72	-98.37	681.25
CAR_runup (-63, -1)	474	0.03	0.31	-1.11	1.80
CAR_markup (0, 126)	474	0.15	0.52	-1.93	2.91
CAR_prem (-63, 126)	474	0.18	0.68	-2.82	4.70
CAR (-2, 2)	752	0.23	0.27	-0.62	2.31
Independent Vars					
Target EIS extensiveness	895	0.57	2.14	-0.88	6.43
Target EIS standardization	507	-0.59	0.58	-2.22	0.00
Control Vars					
Hostile	908	7%	26%	0.00	1.00
Tender_offer	908	15%	36%	0.00	1.00
Toehold	908	8%	27%	0.00	1.00
Number of competitors	908	0.04	0.22	0.00	2.00
Merger_of_equal	908	1%	9%	0.00	1.00
ROE	902	0.01	0.88	-9.12	11.83
Market to book ratio	901	1.90	7.25	-111.97	65.92
Log(Target market capitalization)	908	13.24	2.02	6.83	19.02
Vertical relatedness index	767	0.03	0.06	0.00	0.66
Horizontal complimentarity coefficient	767	0.51	0.40	-0.01	1.00
Anchoring effect	835	46.75	107.56	-99.91	1869
Target advisor average premium: 3 years prior	578	44.42	27.94	-16.67	399
Target selection CAR	908	-0.08	1.30	-10.91	7.64

Table 13: Correlation Matrix for the Target Sample

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	Premium: stock price 4 week prior																			
2	CAR_runup (-63, -1)	-0.2434*	1																	
3	CAR_markup (0, 126)	0.0031	0.2689*	1																
4	CAR_prem (-63, 126)	-0.1093	0.6681*	0.8963*	1															
5	CAR (-2, 2)	0.5028*	-0.018	0.4703*	0.3513*	1														
6	Target EIS extensiveness	0.0082	0.0924*	0.0181	0.0561	0.0793*	1													
7	Target EIS standardization	0.0838	0.0689	0.0519	0.07	0.1226*	-0.0184	1												
8	Hostile	-0.0412	0.0737	0.1033*	0.1137*	-0.0055	0.0822*	-0.0324	1											
9	Tender_offer	0.0616	0.0554	0.0418	0.0578	0.1755*	0.0718*	0.0278	0.0587	1										
10	Toehold	0.0207	-0.001	0.0939*	0.0721	-0.0035	-0.0858*	-0.0614	0.1919*	0.0059	1									
11	Number of competitors	0.0146	0.0197	0.0676	0.0613	-0.0049	-0.0174	0.0491	0.1964*	0.0309	0.0773*	1								
12	Merger_of_equal	-0.0151	0.0104	-0.023	-0.013	-0.0312	0.0507	-0.0943*	-0.0264	-0.0399	-0.027	0.1420*	1							
13	ROE	-0.0008	-0.0161	-0.0305	-0.031	-0.0346	0.0066	-0.0225	-0.0483	-0.0556	-0.0603	-0.0059	0.0074	1						
14	Market to book ratio	-0.0519	0.0034	-0.0128	-0.0083	-0.0692	0.0366	0.0326	-0.0445	-0.0341	-0.0571	-0.008	-0.0013	0.0920*	1					
15	Log(Target market capitalization)	-0.1261*	-0.0081	-0.0106	-0.0119	-0.1432*	0.0715*	-0.2969*	0.0393	0.0256	-0.005	0.0295	0.0766*	0.0271	0.0933*	1				
16	Vertical relatedness index	-0.0062	0.0444	0.0136	0.0305	0.0847*	-0.0453	0.0034	-0.0106	0.0204	-0.0475	0.1114*	0.0602	-0.0049	-0.0232	0.0568	1			
17	Horizontal complimentarity coefficient	0.0123	0.0502	0.0595	0.0694	0.0998*	0.008	0.0554	0.0327	0.0634	-0.0332	0.0751*	0.0971*	0.0223	0.0132	0.0056	0.3788*	1		
18	Anchoring effect	-0.0354	-0.0012	0.0193	0.0146	-0.0066	0.0198	-0.0071	0.0337	-0.0335	-0.0186	0.0194	-0.0115	0.0149	0.0187	-0.0026	-0.0196	-0.038	1	
19	Target advisor average premium: 3 years prior	-0.0291	0.0368	-0.0038	0.0123	-0.0194	0.0807	0.1167*	-0.0346	-0.0648	-0.0645	-0.0245	-0.0085	-0.0154	0.0165	-0.1456*	0.0193	0.0423	-0.012	1
20	Selection CAR	0.0505	-0.1149*	-0.1489*	-0.1679*	-0.0148	-0.0395	-0.0900*	-0.0285	-0.0274	-0.0396	-0.0147	0.0333	-0.0338	0.0097	-0.016	-0.0188	0.0468	-0.007	0.0122

* significantly correlated at 0.05 level.

Table 14: Descriptive Statistics for the Universe of Firms

	N	Mean	Std. Dev.	Min	Max
Selection CAR	15,321	0.06	1.22	-10.91	15.96
Log(market capitalization)	15,321	13.63	2.09	5.88	20.28
ROE	15,214	0.01	1.31	-95.67	52.18
Market to book ratio	15,195	1.57	35.65	-4027.24	96.49
EIS extensiveness	15,138	0.55	2.02	-0.88	6.43
EIS standardization	9,278	-0.68	0.62	-2.59	0.00

Table 15.1: Show Potential Acquirer Sample Bias – Compare the Descriptive Statistics between the Full Sample and the Complete Sample

	Sample Mean					
	Full sample	Complete sample Premium 4week model	Difference	(p-value)	N_full	N_complete
Premium: stock price 4 week prior	57.84	80.08	-22.24	0.35	1,385	214
Target EIS extensiveness	0.58	0.63	-0.05	0.72	4,604	214
Target advisor average premium: 3 years prior	42.84	41.67	1.17	0.53	2,567	214
Anchoring effect	50.35	41.68	8.66	0.51	19,973	214
Hostile	0.00	0.07	-0.06	0.00	22,498	214
Tender_offer	0.01	0.24	-0.23	0.00	22,498	214
Toehold	0.04	0.04	0.01	0.62	22,498	214
Merger_of_equal	0.00	0.01	-0.01	0.00	22,498	214
Number of competitors	0.01	0.12	-0.11	0.00	22,498	214
Vertical relatedness index	0.03	0.04	-0.01	0.00	20,831	214
Horizontal complimentarity coefficient	0.60	0.74	-0.14	0.00	20,831	214
ROE	0.08	0.07	0.01	0.97	11,793	214
Market to book ratio	6.10	3.31	2.79	0.93	11,661	214
Transaction_value	278.17	2926.72	-2648.55	0.00	12,933	214
Target total assets	2633.68	3499.11	-865.43	0.79	2,781	207
Target common equity	466.36	1049.77	-583.40	0.08	2,719	207
Acquirer common equity	4712.91	7722.68	-3009.77	0.00	12,303	214
Acquier sales	7355.65	12300.42	-4944.77	0.00	12,309	214

Table 15.2: Show Potential Acquirer Sample Bias – Compare the Descriptive Statistics between the Full Sample and the Complete Sample

	Sample Mean					
	Full sample	Complete sample Premium 4week + Standardization model	Difference	(p-value)	N_full	N_complete
Premium: stock price 4 week prior	57.84	95.13	-37.29	0.18	1,385	157
Target EIS extensiveness	0.58	1.08	-0.50	0.00	4,604	157
Target EIS standardization	-0.77	-0.81	0.04	0.49	3,025	157
Target advisor average premium: 3 years prior	42.84	41.17	1.66	0.44	2,567	157
Anchoring effect	50.35	42.43	7.92	0.61	19,973	157
Hostile	0.00	0.06	-0.06	0.00	22,498	157
Tender_offer	0.01	0.25	-0.25	0.00	22,498	157
Toehold	0.04	0.04	0.01	0.70	22,498	157
Merger_of_equal	0.00	0.01	-0.01	0.09	22,498	157
Number of competitors	0.01	0.10	-0.09	0.00	22,498	157
Vertical relatedness index	0.03	0.05	-0.01	0.00	20,831	157
Horizontal complimentarity coefficient	0.60	0.74	-0.14	0.00	20,831	157
ROE	0.08	0.07	0.01	0.97	11,793	157
Market to book ratio	6.10	3.14	2.97	0.93	11,661	157
Transaction_value	278.17	3387.71	-3109.54	0.00	12,933	157
Target total assets	2633.68	3640.46	-1006.78	0.79	2,781	154
Target common equity	466.36	1124.66	-658.29	0.08	2,719	154
Acquirer common equity	4712.91	9273.75	-4560.84	0.00	12,303	157
Acquier sales	7355.65	15477.76	-8122.12	0.00	12,309	157

Table 15.3: Show Potential Acquirer Sample Bias – Compare the Descriptive Statistics between the Full Sample and the Complete Sample

	Sample Mean					
	Full sample	Complete sample CAR model	Difference	(p-value)	N_full	N_complete
CAR_runup (-63, -1)	0.00	0.00	0.00	0.69	2,768	330
CAR_markup (0, 126)	-0.03	0.00	-0.03	0.14	2,768	330
CAR_prem (-63, 126)	-0.03	0.00	-0.03	0.20	2,768	330
CAR (-2, 2)	0.01	0.01	0.00	0.89	1,975	331
Target EIS extensiveness	0.58	0.51	0.07	0.56	4,604	331
Target advisor average premium: 3 years prior	42.84	46.33	-3.49	0.03	2,567	331
Anchoring effect	50.35	48.59	1.76	0.87	19,973	331
Hostile	0.00	0.02	-0.01	0.00	22,498	331
Tender_offer	0.01	0.04	-0.03	0.00	22,498	331
Toehold	0.04	0.02	0.02	0.07	22,498	331
Merger_of_equal	0.00	0.01	-0.01	0.00	22,498	331
Number of competitors	0.01	0.05	-0.04	0.00	22,498	331
Vertical relatedness index	0.03	0.04	-0.01	0.00	20,831	331
Horizontal complimentarity coefficient	0.60	0.71	-0.11	0.00	20,831	331
ROE	0.08	0.03	0.05	0.76	11,793	331
Market to book ratio	6.10	137.98	-131.88	0.00	11,661	331
Transaction_value	278.17	1048.91	-770.74	0.00	12,933	313
Target total assets	2633.68	2513.83	119.85	0.97	2,781	163
Target common equity	466.36	586.82	-120.46	0.74	2,719	161
Acquirer common equity	4712.91	2752.25	1960.66	0.01	12,303	331
Acquier sales	7355.65	4281.86	3073.79	0.01	12,309	331

Table 15.4: Show Potential Acquirer Sample Bias – Compare the Descriptive Statistics between the Full Sample and the Complete Sample

	Sample Mean					
	Full sample	Complete sample CAR + Standardization model	Difference	(p-value)	N_full	N_complete
CAR_runup (-63, -1)	0.00	0.00	0.00	0.91	2,768	219
CAR_markup (0, 126)	-0.03	-0.02	-0.01	0.62	2,768	219
CAR_prem (-63, 126)	-0.03	-0.02	-0.01	0.68	2,768	219
CAR (-2, 2)	0.01	0.01	0.00	0.82	1,975	219
Target EIS extensiveness	0.58	1.01	-0.43	0.00	4,604	219
Target EIS standardization	-0.77	-0.60	-0.17	0.00	3,025	219
Target advisor average premium: 3 years prior	42.84	44.87	-2.03	0.29	2,567	219
Anchoring effect	50.35	49.89	0.45	0.97	19,973	219
Hostile	0.00	0.01	-0.01	0.03	22,498	219
Tender_offer	0.01	0.04	-0.03	0.00	22,498	219
Toehold	0.04	0.02	0.02	0.12	22,498	219
Merger_of_equal	0.00	0.00	0.00	0.20	22,498	219
Number of competitors	0.01	0.04	-0.03	0.00	22,498	219
Vertical relatedness index	0.03	0.04	-0.01	0.00	20,831	219
Horizontal complimentarity coefficient	0.60	0.73	-0.13	0.00	20,831	219
ROE	0.08	0.05	0.03	0.90	11,793	219
Market to book ratio	6.10	2.39	3.72	0.90	11,661	219
Transaction_value	278.17	1196.18	-918.00	0.00	12,933	206
Target total assets	2633.68	2877.71	-244.03	0.96	2,781	102
Target common equity	466.36	638.19	-171.82	0.71	2,719	101
Acquirer common equity	4712.91	3438.58	1274.33	0.19	12,303	219
Acquier sales	7355.65	5568.02	1787.63	0.24	12,309	219

Table 16.1: Show Potential Target Sample Bias – Compare the Descriptive Statistics between the Full Sample and the Complete Sample

	Sample Mean					
	Full sample	Complete sample Premium 4week model	Difference	(p-value)	N_full	N_complete
Premium: stock price 4 week prior	51.04	45.68	5.36	0.65	3,149	335
Target EIS extensiveness	0.57	0.66	-0.09	0.50	876	335
Target advisor average premium: 3 years prior	41.70	41.19	0.52	0.68	1,557	335
Anchoring effect	46.96	41.02	5.94	0.59	5,354	335
Hostile	0.04	0.07	-0.03	0.00	5,717	335
Tender_offer	0.08	0.24	-0.15	0.00	5,717	335
Toehold	0.12	0.04	0.08	0.00	5,717	335
Merger_of_equal	0.00	0.02	-0.01	0.00	5,717	335
Number of competitors	0.05	0.04	0.01	0.41	5,717	335
Vertical relatedness index	0.03	0.04	-0.01	0.00	5,009	335
Horizontal complimentarity coefficient	0.48	0.61	-0.13	0.00	5,009	335
ROE	-0.01	0.00	-0.01	0.96	2,498	335
Market to book ratio	6.13	2.28	3.85	0.64	2,478	335
Transaction_value	750.42	3244.96	-2494.54	0.00	4,389	335
Target total assets	5549.76	3466.27	2083.48	0.67	5,105	335
Target common equity	611.12	1131.29	-520.17	0.14	5,139	335

Table 16.2: Show Potential Target Sample Bias – Compare the Descriptive Statistics between the Full Sample and the Complete Sample

	Sample Mean					
	Full sample	Complete sample Premium 4week + Standardization model	Difference	(p-value)	N_full	N_complete
Premium: stock price 4 week prior	51.04	44.68	6.35	0.68	3,149	197
Target EIS extensiveness	0.57	1.64	-1.07	0.00	876	197
Target EIS standardization	-0.59	-0.59	0.00	0.96	495	197
Target advisor average premium: 3 years prior	41.70	40.58	1.12	0.48	1,557	197
Anchoring effect	46.96	39.23	7.73	0.59	5,354	197
Hostile	0.04	0.10	-0.06	0.00	5,717	197
Tender_offer	0.08	0.24	-0.16	0.00	5,717	197
Toehold	0.12	0.04	0.08	0.00	5,717	197
Merger_of_equal	0.00	0.02	-0.02	0.00	5,717	197
Number of competitors	0.05	0.04	0.01	0.73	5,717	197
Vertical relatedness index	0.03	0.04	-0.01	0.00	5,009	197
Horizontal complimentarity coefficient	0.48	0.58	-0.10	0.00	5,009	197
ROE	-0.01	0.03	-0.04	0.90	2,498	192
Market to book ratio	6.13	2.50	3.63	0.73	2,478	192
Transaction_value	750.42	4518.00	-3767.58	0.00	4,389	197
Target total assets	5549.76	4336.15	1213.61	0.85	5,105	197
Target common equity	611.12	1597.70	-986.58	0.03	5,139	197

Table 16.3: Show Potential Target Sample Bias – Compare the Descriptive Statistics between the Full Sample and the Complete Sample

	Sample Mean					
	Full sample	Complete sample CAR model	Difference	(p-value)	N_full	N_complete
CAR_runup (-63, -1)	0.03	0.04	-0.01	0.65	464	113
CAR_markup (0, 126)	0.15	0.22	-0.08	0.15	464	113
CAR_prem (-63, 126)	0.17	0.27	-0.09	0.18	464	113
CAR (-2, 2)	0.23	0.31	-0.08	0.00	746	298
Target EIS extensiveness	0.57	0.61	-0.05	0.75	876	298
Target advisor average premium: 3 years prior	41.70	41.11	0.59	0.65	1,557	298
Anchoring effect	46.96	39.67	7.29	0.54	5,354	298
Hostile	0.04	0.06	-0.02	0.10	5,717	298
Tender_offer	0.08	0.23	-0.14	0.00	5,717	298
Toehold	0.12	0.05	0.07	0.00	5,717	298
Merger_of_equal	0.00	0.02	-0.01	0.01	5,717	298
Number of competitors	0.05	0.04	0.01	0.65	5,717	298
Vertical relatedness index	0.03	0.04	-0.01	0.00	5,009	298
Horizontal complimentarity coefficient	0.48	0.64	-0.15	0.00	5,009	298
ROE	-0.01	-0.01	-0.01	0.97	2,498	294
Market to book ratio	6.13	2.14	3.99	0.64	2,478	294
Transaction_value	750.42	2616.79	-1866.37	0.00	4,389	297
Target total assets	5549.76	3235.26	2314.49	0.65	5,105	296
Target common equity	611.12	1044.37	-433.25	0.24	5,139	296

Table 16.4: Show Potential Target Sample Bias – Compare the Descriptive Statistics between the Full Sample and the Complete Sample

	Sample Mean					
	Full sample	Complete sample CAR + Standardization model	Difference	(p-value)	N_full	N_complete
CAR_runup (-63, -1)	0.03	0.04	-0.01	0.79	464	72
CAR_markup (0, 126)	0.15	0.21	-0.07	0.32	464	72
CAR_prem (-63, 126)	0.17	0.25	-0.08	0.37	464	72
CAR (-2, 2)	0.23	0.32	-0.09	0.00	746	171
Target EIS extensiveness	0.57	1.61	-1.04	0.00	876	171
Target EIS standardization	-0.59	-0.56	-0.03	0.62	495	171
Target advisor average premium: 3 years prior	41.70	40.07	1.64	0.33	1,557	171
Anchoring effect	46.96	37.17	9.79	0.53	5,354	171
Hostile	0.04	0.08	-0.04	0.00	5,717	171
Tender_offer	0.08	0.22	-0.14	0.00	5,717	171
Toehold	0.12	0.05	0.07	0.00	5,717	171
Merger_of_equal	0.00	0.02	-0.01	0.02	5,717	171
Number of competitors	0.05	0.05	0.00	0.98	5,717	171
Vertical relatedness index	0.03	0.04	-0.01	0.00	5,009	171
Horizontal complimentarity coefficient	0.48	0.62	-0.13	0.00	5,009	171
ROE	-0.01	0.02	-0.03	0.92	2,498	170
Market to book ratio	6.13	2.39	3.74	0.74	2,478	170
Transaction_value	750.42	3683.22	-2932.80	0.00	4,389	170
Target total assets	5549.76	4042.65	1507.10	0.83	5,105	170
Target common equity	611.12	1504.78	-893.66	0.07	5,139	170

Table 17.1: The Impact of Acquirer EIS on Premium and Stock Market Reaction: Heckman Two-step Model using the Acquirer Sample

	Stage 1: likelihood of being an acquirer	Stage 1: likelihood of bidding on a public target	Stage 2 Dep Var = Premium: stock price 4 week prior			Stage 2 Dep Var = CAR_prem (-63, 126)			Stage 2 Dep Var = CAR (-2, 2)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Acquirer EIS extensiveness	0.00448		0.62	3.231	0.123	-0.0151	-0.0222	-0.017	-0.00241	-0.00141	-0.0037
	(0.01)		(1.74)	(4.66)	(2.23)	(0.01)	(0.02)	(0.01)	(0.00)	(0.00)	(0.00)
EIS extensiveness * Horr_corr				-3.217			0.0109			-0.00153	
				(5.32)			(0.02)			(0.01)	
Acquirer EIS extensiveness * VRI					10.49			0.0468			0.0331
					(29.60)			(0.16)			(0.04)
Acquirer advisor average premium: 3 years prior			-0.278	-0.28	-0.278	0.00104	0.00103	0.00104	0.000270*	0.000271*	0.000268*
			(0.21)	(0.21)	(0.21)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Anchoring effect			0.0274	0.0306	0.0291	0.000831***	0.000829***	0.000831***	-0.0000416	-0.0000414	-0.0000409
			(0.05)	(0.05)	(0.05)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Hostile			-0.422	-1.069	-0.366	0.151	0.154	0.151	0.0258	0.0257	0.0241
			(14.31)	(14.37)	(14.34)	(0.14)	(0.14)	(0.14)	(0.05)	(0.05)	(0.05)
Tender_offer			7.618	8.121	7.528	-0.229***	-0.230***	-0.229***	-0.0253	-0.0252	-0.0251
			(8.31)	(8.36)	(8.33)	(0.08)	(0.08)	(0.08)	(0.03)	(0.03)	(0.03)
Toehold			-20.51	-19.89	-20.55	0.0912	0.09	0.0898	0.0241	0.0244	0.023
			(15.41)	(15.47)	(15.44)	(0.11)	(0.11)	(0.11)	(0.03)	(0.03)	(0.03)
Merger_of_equal			-1.977	-1.475	-1.821	-0.254	-0.254	-0.254	0.00484	0.00489	0.0049
			(26.12)	(26.18)	(26.19)	(0.22)	(0.22)	(0.22)	(0.05)	(0.05)	(0.05)
Number of competitors			24.19***	23.99***	23.81***	0.0936	0.0947	0.0928	0.000908	0.000713	0.000524
			(9.05)	(9.07)	(9.13)	(0.07)	(0.08)	(0.08)	(0.02)	(0.02)	(0.02)
Vertical relatedness index			-22.78	-22.75	-22.72	0.309	0.307	0.292	0.0941	0.0946	0.0748
			(37.52)	(37.58)	(37.61)	(0.27)	(0.27)	(0.28)	(0.07)	(0.07)	(0.08)
Horizontal complimentarity coefficient			-15.56	-13.9	-15.58	0.0279	0.0217	0.0273	0.0345**	0.0354**	0.0343**
			(9.98)	(10.37)	(10.00)	(0.05)	(0.06)	(0.05)	(0.01)	(0.01)	(0.01)
ROE	0.0151		-3.883	-4.321	-4.234	-0.0727	-0.0726	-0.0785	0.0324	0.0324	0.029
	(0.01)		(31.07)	(31.13)	(31.16)	(0.16)	(0.16)	(0.16)	(0.04)	(0.04)	(0.04)
Market to book ratio	0.000496	0.000375	0.104	0.13	0.115	-0.00291	-0.00296	-0.00279	-0.0000925	-0.0000843	-0.0000275
	(0.00)	(0.00)	(0.97)	(0.97)	(0.97)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Heckman Lambda 1			201.7**	212.4**	203.4**	-0.925	-0.922	-0.901	-0.358*	-0.360*	-0.342*
			(100.10)	(101.80)	(100.50)	(0.68)	(0.68)	(0.68)	(0.19)	(0.19)	(0.19)
Heckman Lambda 2			-410.0**	-430.1**	-414.1**	-0.877	-0.874	-0.851	-0.352*	-0.355*	-0.334*
			(199.30)	(202.40)	(200.10)	(0.69)	(0.69)	(0.69)	(0.20)	(0.20)	(0.20)
Selection CAR	-0.0108	0.0167									
	(0.01)	(0.03)									
Log(Acquirer market capitalization)	0.176***	0.0765***									
	(0.01)	(0.01)									
Constant	-3.164***	-2.394***	535.3**	556.2**	540.4**	1.748	1.747	1.697	0.712*	0.717*	0.678*
	(0.08)	(0.22)	(228.90)	(231.90)	(229.90)	(1.43)	(1.43)	(1.45)	(0.40)	(0.40)	(0.41)
Observations	15,018	3,602	203	203	203	437	437	437	316	316	316
R-squared			0.107	0.109	0.108	0.098	0.098	0.098	0.072	0.072	0.074

Table 17.2: The Impact of Acquirer EIS on Premium and Stock Market Reaction: Heckman Two-step Model using the Acquirer Sample

VARIABLES	Stage 1: likelihood of being an acquirer	Stage 1: likelihood of bidding on a public target	Stage 2 Dep Var = Premium: stock price 4 week prior			Stage 2 Dep Var = CAR_prem (-63, 126)			Stage 2 Dep Var = CAR (-2, 2)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Acquirer EIS extensiveness	-0.0167**		-6.713**	-4.408	-7.708**	0.0269*	0.0127	0.0235	0.00697	0.00561	0.00708
	(0.01)		(3.02)	(5.97)	(3.57)	(0.01)	(0.02)	(0.02)	(0.00)	(0.01)	(0.01)
EIS extensiveness * Horr_corr				-3.07			0.0232			0.00211	
				(6.86)			(0.03)			(0.01)	
Acquirer EIS extensiveness * VRI					19.49			0.068			-0.00262
					(36.94)			(0.17)			(0.05)
Acquirer EIS standardization	-0.1000***		-22.28	-23.16	-22.85	0.160**	0.163**	0.155*	0.0324	0.0323	0.0325
	(0.02)		(14.03)	(14.21)	(14.11)	(0.08)	(0.08)	(0.08)	(0.02)	(0.02)	(0.02)
Acquirer advisor average premium: 3 years prior			-0.262	-0.256	-0.262	0.00105	0.00105	0.00105	0.000289	0.00029	0.000289
			(0.27)	(0.27)	(0.27)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Anchoring effect			0.0437	0.0462	0.0428	0.000922***	0.000918***	0.000920***	-0.0000282	-0.0000284	-0.0000281
			(0.07)	(0.07)	(0.07)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Hostile			-6.381	-6.992	-5.961	0.153	0.159	0.152	0.0473	0.0475	0.0475
			(18.69)	(18.80)	(18.76)	(0.14)	(0.14)	(0.14)	(0.05)	(0.05)	(0.05)
Tender_offer			6.192	6.685	6.077	-0.153*	-0.157*	-0.152*	-0.027	-0.0272	-0.0271
			(10.63)	(10.72)	(10.66)	(0.09)	(0.09)	(0.09)	(0.03)	(0.03)	(0.03)
Toehold			-8.881	-9.329	-9.606	0.0623	0.0634	0.0611	0.0356	0.0356	0.0357
			(20.97)	(21.06)	(21.07)	(0.13)	(0.13)	(0.13)	(0.04)	(0.04)	(0.04)
Merger_of_equal			-17.34	-17.66	-17.2	-0.0524	-0.0483	-0.0527	-0.0547	-0.0544	-0.0546
			(48.16)	(48.31)	(48.29)	(0.34)	(0.34)	(0.34)	(0.08)	(0.08)	(0.08)
Number of competitors			36.85***	36.70***	36.16***	0.036	0.0388	0.0354	-0.0151	-0.0148	-0.0151
			(12.68)	(12.73)	(12.79)	(0.09)	(0.09)	(0.09)	(0.03)	(0.03)	(0.03)
Vertical relatedness index			-37.23	-36.44	-43.67	0.24	0.232	0.184	0.152*	0.150*	0.155
			(48.56)	(48.74)	(50.20)	(0.30)	(0.30)	(0.33)	(0.09)	(0.09)	(0.12)
Horizontal complimentarity coefficient			-20.59	-17.12	-20.86	0.0166	-0.00907	0.0156	0.0312*	0.0287	0.0312*
			(13.45)	(15.56)	(13.50)	(0.06)	(0.07)	(0.06)	(0.02)	(0.02)	(0.02)
ROE	0.0178		-13.82	-14.34	-14.41	0.172	0.176	0.162	0.0908	0.0913	0.091
	(0.01)		(39.20)	(39.34)	(39.33)	(0.22)	(0.22)	(0.22)	(0.06)	(0.06)	(0.06)
Market to book ratio	0.000191	0.000375	3.127	3.188	3.135	-0.00846	-0.00899	-0.00841	-0.000804	-0.000851	-0.000804
	(0.00)	(0.00)	(2.63)	(2.64)	(2.64)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)
mills1			436.3**	446.4**	445.8**	-2.091**	-2.116**	-2.021**	-0.656**	-0.652**	-0.657**
			(171.40)	(173.40)	(172.80)	(0.97)	(0.97)	(0.98)	(0.30)	(0.30)	(0.30)
mills2			-701.2**	-717.6**	-718.4**	-1.506*	-1.527**	-1.446*	-0.503**	-0.499**	-0.504**
			(275.20)	(278.50)	(277.90)	(0.77)	(0.77)	(0.79)	(0.25)	(0.25)	(0.25)
Selection CAR	-0.0113	0.0167									
	(0.01)	(0.03)									
Log(Acquirer market capitalization)	0.142***	0.0765***									
	(0.01)	(0.01)									
Constant	-2.685***	-2.394***	762.9***	775.8***	782.0***	3.726**	3.795**	3.589*	1.202**	1.197**	1.205**
	(0.11)	(0.22)	(276.30)	(278.60)	(279.40)	(1.88)	(1.88)	(1.91)	(0.59)	(0.59)	(0.59)
Observations	9187	3602	147	147	147	300	300	300	206	206	206
R-squared			0.148	0.149	0.149	0.142	0.144	0.143	0.136	0.136	0.136

Table 18.1: The Impact of Target EIS on Premium and Stock Market Reaction: Heckman Two-step Model using the Target Sample

	Stage 1: likelihood of being a target	Stage 2 Dep Var = Premium: stock price 4 week prior			Stage 1: likelihood of being a target	Stage 2 Dep Var = CAR (-2, 2)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Target EIS extensiveness	0.0136	1.815	1.859	1.128	0.0077	0.0109	0.0111	0.0092
	(0.01)	(1.21)	(1.57)	(1.30)	(0.01)	(0.01)	(0.01)	(0.01)
EIS extensiveness * Horr_corr			-0.0777				-0.000281	
			(1.75)				(0.02)	
Target EIS extensiveness * VRI				23.74				0.0663
				(14.69)				(0.16)
Target EIS standardization								
Target advisor average premium: 3 years prior		0.0102	0.0101	0.0134		-0.000467	-0.000467	-0.000463
		(0.07)	(0.07)	(0.07)		(0.00)	(0.00)	(0.00)
Anchoring effect		0.031	0.0311	0.0304		0.000194	0.000194	0.000198
		(0.02)	(0.02)	(0.02)		(0.00)	(0.00)	(0.00)
Log(Target market capitalization)	-0.0248**	-1.852	-1.85	-1.824	-0.0411***	-0.0144	-0.0144	-0.0143
	(0.01)	(1.37)	(1.37)	(1.37)	(0.01)	(0.01)	(0.01)	(0.01)
Hostile		-4.785	-4.775	-5.344		-0.0292	-0.0291	-0.0294
		(5.94)	(5.94)	(5.90)		(0.06)	(0.06)	(0.06)
Tender_offer		12.19***	12.21***	12.15***		0.0995***	0.0996***	0.0986***
		(3.48)	(3.51)	(3.47)		(0.03)	(0.03)	(0.03)
Toehold		-1.152	-1.14	-2.42		-0.124*	-0.124*	-0.125*
		(7.40)	(7.41)	(7.40)		(0.07)	(0.07)	(0.07)
Merger_of_equal		-12.32	-12.24	-12.49		-0.14	-0.139	-0.139
		(11.30)	(11.45)	(11.30)		(0.12)	(0.12)	(0.12)
Number of competitors		2.763	2.742	2.328		-0.0818	-0.0819	-0.0839
		(5.63)	(5.65)	(5.60)		(0.06)	(0.06)	(0.06)
Vertical relatedness index		-97.06***	-97.02***	-94.88***		0.492**	0.492**	0.519**
		(30.33)	(30.34)	(32.67)		(0.22)	(0.22)	(0.23)
Horizontal complimentarity coefficient		0.923	0.973	-0.305		-0.0189	-0.0187	-0.0217
		(4.03)	(4.18)	(4.13)		(0.04)	(0.04)	(0.04)
ROE	-0.00635	11.18**	11.17**	11.19**	0.00145	-0.0168	-0.0168	-0.0167
	(0.01)	(4.99)	(4.99)	(4.98)	(0.02)	(0.02)	(0.02)	(0.02)
Market to book ratio	9.79E-05	-0.533	-0.534	-0.524	-1.70E-06	-0.0025	-0.0025	-0.0025
	(0.00)	(0.36)	(0.36)	(0.36)	(0.00)	(0.00)	(0.00)	(0.00)
Selection CAR	-0.0243**				-0.0257			
	(0.01)				(0.02)			
Constant	-1.586***	-166.6***	-166.7***	-166.2***	-1.394***	0.535	0.535	0.518
	(0.14)	(23.25)	(23.29)	(23.29)	(0.15)	(0.37)	(0.37)	(0.46)
Observations	14,782	14,782	14,782	14,782	14,654	14,654	14,654	14,654

Table 18.2: The Impact of Target EIS on Premium and Stock Market Reaction: Heckman Two-step Model using the Target Sample

	Stage 1: likelihood of being a target	Stage 2 Dep Var = CAR_runup (-63, -1)			Stage 1: likelihood of being a target	Stage 2 Dep Var = CAR_markup (0, 126)			Stage 1: likelihood of being a target	Stage 2 Dep Var = CAR_prem (-63, 126)		
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
Target EIS extensiveness	-0.0187	-0.00868	0.0115	-0.006	-0.0182	-0.0138	-0.0819	-0.0296	-0.0184	-0.0165	-0.0839	-0.0421
	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)	(0.03)	(0.05)	(0.03)	(0.02)	(0.03)	(0.05)	(0.04)
EIS extensiveness * Horr_corr			-0.028				0.0999				0.0998	
			(0.03)				(0.06)				(0.06)	
Target EIS extensiveness * VRI				-0.0618				0.41				0.71
				(0.18)				(0.46)				(0.53)
Target EIS standardization												
Target advisor average premium: 3 years prior		0.000229	0.00024	0.000228		-0.00122	-0.00127	-0.00121		-0.00147	-0.00149	-0.00146
		(0.00)	(0.00)	(0.00)		(0.00)	(0.00)	(0.00)		(0.00)	(0.00)	(0.00)
Anchoring effect		-9.09E-05	-7.51E-05	-0.000077		-0.000208	-0.000284	-0.000306		-0.000396	-0.000498	-0.000588
		(0.00)	(0.00)	(0.00)		(0.00)	(0.00)	(0.00)		(0.00)	(0.00)	(0.00)
Log(Target market capitalization)	0.0247*	0.0220*	0.0230*	0.0223*	0.0232	-0.0500*	-0.0549*	-0.0506*	0.0227	-0.0733**	-0.0763**	-0.0736**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.03)	(0.03)	(0.03)	(0.01)	(0.03)	(0.03)	(0.03)
Hostile		0.100*	0.102*	0.0995*		0.265**	0.255**	0.259**		0.413***	0.403***	0.405***
		(0.05)	(0.05)	(0.05)		(0.12)	(0.12)	(0.12)		(0.13)	(0.13)	(0.13)
Tender_offer		0.0441	0.0545	0.0461		-0.219	-0.248*	-0.232		-0.179	-0.205	-0.206
		(0.06)	(0.06)	(0.06)		(0.15)	(0.15)	(0.15)		(0.15)	(0.15)	(0.15)
Toehold		-0.0439	-0.0417	-0.0408		-0.156	-0.154	-0.164		-0.224	-0.215	-0.227
		(0.07)	(0.07)	(0.07)		(0.16)	(0.16)	(0.16)		(0.17)	(0.17)	(0.17)
Merger_of_equal		0.0811	0.118	0.0769		-0.114	-0.244	-0.0976		-0.0448	-0.182	-0.034
		(0.12)	(0.12)	(0.12)		(0.30)	(0.31)	(0.30)		(0.32)	(0.32)	(0.31)
Number of competitors		-0.0818	-0.0925	-0.0787		0.047	0.0869	0.0287		-0.0831	-0.0453	-0.124
		(0.06)	(0.06)	(0.06)		(0.14)	(0.14)	(0.14)		(0.14)	(0.14)	(0.15)
Vertical relatedness index		0.0198	0.0397	-0.000577		0.0065	-0.0637	0.113		0.0941	0.0394	0.294
		(0.25)	(0.25)	(0.26)		(0.65)	(0.64)	(0.64)		(0.70)	(0.69)	(0.67)
Horizontal complimentarity coefficient		0.116***	0.125***	0.118***		0.107	0.0722	0.0933		0.196*	0.165	0.176
		(0.04)	(0.05)	(0.04)		(0.11)	(0.11)	(0.11)		(0.11)	(0.11)	(0.11)
ROE	0.0146	-0.0342*	-0.0345*	-0.0341*	0.0208	-0.0752*	-0.0697*	-0.0738*	0.0214	-0.116**	-0.111**	-0.113**
	(0.03)	(0.02)	(0.02)	(0.02)	(0.03)	(0.04)	(0.04)	(0.04)	(0.03)	(0.05)	(0.05)	(0.05)
Market to book ratio	-3.73E-05	-0.015	-0.0156*	-0.0151	-3.53E-05	-0.00579	-0.00509	-0.00552	-2.97E-05	-0.0153	-0.0137	-0.0138
	(0.00)	(0.01)	(0.01)	(0.01)	(0.00)	(0.02)	(0.02)	(0.02)	(0.00)	(0.02)	(0.02)	(0.02)
Selection CAR	-0.0111				-0.00498				-0.00238			
	(0.02)				(0.02)				(0.02)			
Constant	-2.631***	-1.692***	-1.754***	-1.710***	-2.611***	3.455***	3.664***	3.511***	-2.604***	4.565***	4.690***	4.661***
	(0.20)	(0.31)	(0.32)	(0.32)	(0.20)	(0.78)	(0.76)	(0.77)	(0.20)	(0.79)	(0.77)	(0.77)
Observations	14,704	14,704	14,704	14,704	14,704	14,704	14,704	14,704	14,704	14,704	14,704	14,704

Table 18.3: The Impact of Target EIS on Premium and Stock Market Reaction: Heckman Two-step Model using the Target Sample

	Stage 1: likelihood of being a target	Stage 2 Dep Var = Premium: stock price 4 week prior			Stage 1: likelihood of being a target	Stage 2 Dep Var = CAR (-2, 2)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Target EIS extensiveness	0.0246**	3.564**	4.653**	2.638	0.0230*	0.0181*	0.0314**	0.0184*
	(0.01)	(1.64)	(1.95)	(1.70)	(0.01)	(0.01)	(0.01)	(0.01)
EIS extensiveness * Horr_corr			-1.967				-0.0251	
			(1.97)				(0.02)	
Target EIS extensiveness * VRI				37.56***				-0.0152
				(11.54)				(0.13)
Target EIS standardization	0.129***	16.90**	17.38***	16.19**	0.118**	0.126***	0.126***	0.126***
	(0.05)	(6.71)	(6.72)	(6.69)	(0.05)	(0.04)	(0.04)	(0.04)
Target advisor average premium: 3 years prior		-0.133	-0.136	-0.147		-0.000258	-0.000251	-0.000256
		(0.10)	(0.09)	(0.09)		(0.00)	(0.00)	(0.00)
Anchoring effect		0.04	0.0431	0.0425		0.000315	0.000329	0.000315
		(0.03)	(0.03)	(0.03)		(0.00)	(0.00)	(0.00)
Log(Target market capitalization)	-0.0185	-1.798	-1.614	-1.567	-0.0374**	-0.0216	-0.021	-0.0217
	(0.02)	(2.09)	(2.10)	(2.09)	(0.02)	(0.01)	(0.01)	(0.01)
Hostile		-7.34	-7.943	-7.829		0.0167	0.0205	0.0164
		(6.58)	(6.69)	(6.49)		(0.05)	(0.05)	(0.05)
Tender_offer		12.32***	13.31***	13.15***		0.0816**	0.0935**	0.0817**
		(4.08)	(4.17)	(4.04)		(0.04)	(0.04)	(0.04)
Toehold		-11.23	-10.42	-13.33*		-0.11	-0.115*	-0.109
		(7.79)	(7.67)	(7.32)		(0.07)	(0.07)	(0.07)
Merger_of_equal		-9.957	-7.763	-8.725		-0.0681	-0.0299	-0.0683
		(10.23)	(10.50)	(9.88)		(0.12)	(0.12)	(0.12)
Number of competitors		4.406	3.611	3.049		-0.0439	-0.0581	-0.0433
		(6.00)	(6.07)	(5.84)		(0.07)	(0.07)	(0.07)
Vertical relatedness index		-188.6***	-191.3***	-189.1***		0.225	0.234	0.219
		(35.04)	(34.10)	(28.65)		(0.21)	(0.21)	(0.22)
Horizontal complimentarity coefficient		6.929	10.41*	3.226		-0.0000047	0.0399	0.00145
		(4.65)	(5.73)	(4.83)		(0.04)	(0.05)	(0.04)
ROE	0.00386	16.19***	16.11***	16.68***	0.0243	-0.0237	-0.026	-0.0238
	(0.02)	(3.87)	(3.80)	(3.81)	(0.02)	(0.02)	(0.02)	(0.02)
Market to book ratio	2.19E-03	0.254	0.127	0.444	1.35E-03	-0.00656	-0.008	-0.00658
	(0.00)	(0.93)	(0.95)	(0.87)	(0.00)	(0.01)	(0.01)	(0.01)
Selection CAR	-0.0102				-0.0267			
	(0.01)				(0.02)			
Constant	-1.637***	-197.3***	-201.8***	-200.7***	-1.431***	-0.854***	-0.873***	-0.853***
	(0.21)	(34.12)	(34.36)	(34.63)	(0.21)	(0.24)	(0.24)	(0.24)
Observations	9,096	9,096	9,096	9,096	9,017	9,017	9,017	9,017

Table 18.4: The Impact of Target EIS on Premium and Stock Market Reaction: Heckman Two-step Model using the Target Sample

	Stage 1: likelihood of being a target	Stage 2 Dep Var = CAR_prem (-63, 126)			Stage 1: likelihood of being a target	Stage 2 Dep Var = CAR_runup (-63, -1)			Stage 1: likelihood of being a target	Stage 2 Dep Var = CAR_markup (0, 126)		
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
Target EIS extensiveness	-0.0216	-0.00499	0.00101	-0.00721	-0.0213	-0.032	-0.0501	-0.0397	-0.0213	-0.0382	-0.0507	-0.0484
	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)	(0.03)	(0.06)	(0.04)	(0.02)	(0.04)	(0.07)	(0.04)
EIS extensiveness * Horr_corr			-0.00887				0.0271				0.0186	
			(0.03)				(0.08)				(0.09)	
Target EIS extensiveness * VRI				0.0617				0.2				0.262
				(0.18)				(0.45)				(0.51)
Target EIS standardization	-0.00826	0.0043	0.00382	0.00555	-0.00777	0.057	0.0585	0.0611	-0.00753	0.0616	0.0626	0.0668
	(0.07)	(0.04)	(0.04)	(0.04)	(0.07)	(0.10)	(0.10)	(0.10)	(0.07)	(0.11)	(0.11)	(0.11)
Target advisor average premium: 3 years prior		-0.000437	-0.000437	-0.000436		-0.000306	-0.000319	-0.000294		-0.000715	-0.000724	-0.0007
		(0.00)	(0.00)	(0.00)		(0.00)	(0.00)	(0.00)		(0.00)	(0.00)	(0.00)
Anchoring effect		-0.000148	-0.000129	-0.000168		0.0000163	-0.0000392	-0.0000496		-0.000131	-0.000169	-0.000217
		(0.00)	(0.00)	(0.00)		(0.00)	(0.00)	(0.00)		(0.00)	(0.00)	(0.00)
Log(Target market capitalization)	0.0337	-0.00931	-0.00939	-0.00923	0.0339	0.00403	0.00364	0.00519	0.034	-0.00257	-0.00276	-0.00088
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.04)	(0.04)	(0.04)	(0.02)	(0.05)	(0.05)	(0.05)
Hostile		0.199***	0.200***	0.199***		0.276*	0.275*	0.274*		0.475***	0.475***	0.473***
		(0.06)	(0.06)	(0.06)		(0.15)	(0.15)	(0.15)		(0.17)	(0.17)	(0.17)
Tender_offer		-0.0271	-0.024	-0.029		-0.340*	-0.349*	-0.346*		-0.366*	-0.372*	-0.374*
		(0.08)	(0.08)	(0.08)		(0.19)	(0.19)	(0.19)		(0.22)	(0.22)	(0.22)
Toehold		-0.0517	-0.0534	-0.0526		-0.199	-0.194	-0.202		-0.25	-0.247	-0.255
		(0.08)	(0.08)	(0.08)		(0.20)	(0.20)	(0.20)		(0.22)	(0.22)	(0.22)
Merger_of_equal		0.0693	0.0802	0.0732		-0.125	-0.158	-0.111		-0.0544	-0.0772	-0.0374
		(0.12)	(0.12)	(0.12)		(0.29)	(0.31)	(0.30)		(0.34)	(0.35)	(0.34)
Number of competitors		-0.0951	-0.0995	-0.0978		0.102	0.116	0.0939		0.00684	0.016	-0.00445
		(0.07)	(0.07)	(0.07)		(0.17)	(0.18)	(0.17)		(0.20)	(0.20)	(0.20)
Vertical relatedness index		0.0677	0.0721	0.0827		0.0586	0.0444	0.108		0.127	0.118	0.192
		(0.27)	(0.27)	(0.28)		(0.67)	(0.67)	(0.68)		(0.76)	(0.77)	(0.77)
Horizontal complimentarity coefficient		0.0940*	0.102	0.0896		0.285**	0.261*	0.271*		0.379**	0.362**	0.360**
		(0.06)	(0.06)	(0.06)		(0.14)	(0.15)	(0.14)		(0.16)	(0.17)	(0.16)
ROE	0.0389*	-0.0501**	-0.0508***	-0.0500**	0.0390*	-0.0848*	-0.0832*	-0.0834*	0.0390*	-0.132**	-0.131**	-0.130**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.04)	(0.04)	(0.04)	(0.02)	(0.06)	(0.06)	(0.05)
Market to book ratio	-4.94E-05	-0.0203*	-0.0207*	-0.0199	-3.99E-05	-0.00454	-0.00286	-0.00354	-3.84E-05	-0.0253	-0.0241	-0.024
	(0.00)	(0.01)	(0.01)	(0.01)	(0.00)	(0.03)	(0.03)	(0.03)	(0.00)	(0.03)	(0.03)	(0.03)
Selection CAR	-0.0195				-0.0121				-0.0111			
	(0.04)				(0.04)				(0.03)			
Constant	-2.771***	0.561	0.573	0.575	-2.773***	-0.187	-0.171	-0.226	-2.775***	0.139	0.142	0.0692
	(0.30)	(1.05)	(1.03)	(1.08)	(0.30)	(2.39)	(2.33)	(2.32)	(0.30)	(3.66)	(3.45)	(2.97)
Observations	9,042	9,042	9,042	9,042	9,042	9,042	9,042	9,042	9,042	9,042	9,042	9,042