RECONFIGURING DEPENDENCIES THROUGH ACQUISITIONS: A RESOURCE DEPENDENCY PERSPECTIVE

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ABSTRACT

Organizations are embedded within ecosystems and develop varying degrees of dependence based on the actors within their environment. In this study, we investigate the effects dependency has on firms that rely heavily on a few major customers for their revenue streams. We posit that an increase in dependence on a small number of consumers will have an adverse effect on firm performance (ROA). Furthermore, we assert that firms acquiring other firms in order to counteract these negative repercussions actually demonstrate an improvement in their performance. To test this hypothesis, we conducted an empirical analysis using 12,038 firm-year observations and our empirical results lend support to our predictions.

Keywords: mergers & acquisitions, performance, resource dependency

INTRODUCTION

Mergers and acquisitions (M&As) are one of the most popular forms of corporate expansion in the twenty-first century. Despite the empirical evidence suggesting that M&As seldom create value for the buying firms' (Joshi, Sanchez, & Mudde, 2018; King, Dalton, Daily, & Covin, 2004), M&As remain popular. Academic research is yet to explain the driving force resulting in firms choosing M&As in spite of poor performance record. In this study, we explore the context of a buying firm's resource dependency under which M&As are implemented and ask whether M&As indeed resolve the dependency, and thereby, improve the operating performance of the buying firm. Specifically, this study focuses on a firm's revenue dependency on a few significant customers and examine whether M&As can mitigate the dependence and eventually lead to a higher return on assets (ROA) for the buying firm.

To maintain a coherent perspective in the exploration, this study relies on the resource dependence theory (RDT) as a theoretical lens explaining M&A activity (Hillman, Withers, & Collins, 2009). RDT argues that "to understand the behavior of an organization, you must understand the context of that behavior –that is, the

ecology of the organization." (Pfeffer & Salancik, 1978:1). One such context is the supplier-customer relationship. This research posits that the heavy reliance for revenue generation on a few customers erodes the bargaining power of a supplier, which becomes a resource constraint affecting the organizational ability to function and survive (Pfeffer & Salancik, 1978). One generic strategic response to overcome the constraint is diversification of the market dependence through an acquisition. Therefore, this study focuses on the buyer firm's customer-base concentration and examines the temporal changes in its profitability during the periods before and after the M&As. To the extent that M&As can relax the revenue dependency to a concentrated customer-base, we predict the buyer firm's operating performance will improve after the completion of M&As.

In the empirical test, this study employs a sample of domestically conducted M&As by U.S. firms in high-tech industries between 2000 and 2013. Using a sample of 12,038 U.S. firm-year observations, this research adopts a difference-indifference research design and examines the relationship between customer-base concentration and firm profitability and incremental changes of the association after the expansion of the buyer firm's customer-base through M&As. The results first find that the customer-base concentration has a negative association with ROA, suggesting that the revenue dependency disempower the supplier during the trade bargaining process, thereby leading to a lower ROA. This finding is consistent with our prediction. Also, the results find that the relationship between customer-base concentration and ROA changes post-acquisition, suggesting that acquisitions can help relieve reconfigure the constraints of concentrated customer-base.

We acknowledge that the documented temporal change in the relationship between customer concentration and ROA surrounding M&A activities falls short of articulating the causal mechanism regarding the effect of customer concentration on ROA (Ellsaesser, Tsang, and Runde 2013). Nevertheless, we explore the implication of revenue dependency on a firm's operating performance and the change in the relationship between customer concentration and ROA following M&As to offer an additional venue to apply RDT on M&A activities. With these findings, this study contributes to the understanding of the drivers of M&A activity and the resulting M&A performance. Also, these results provide empirical support to some of the key propositions of RDT theory.

LITERATURE REVIEW AND HYPOTHESIS

Customer Concentration and Performance

Organizations are subjects of their external environments, which influences organizational behaviors (Pfeffer & Salancik, 1978) where entities within the organizational ecosystems establish a network of interdependencies among organizations and constrain them (Hillman et al., 2009). Specifically, the entities within the eco-system that control critical resources and have power over the focal organization and are of significant consequences for the dependent organization (Ulrich & Barney, 1984). Typically, significant customers are the transacting partners that have an enduring impact on an organization's ability to profit (Reddy et al., 2018). Given that twenty percent of customers contribute to eighty percent of revenues for most firms (Luo & Kumar, 2013; Zeithaml, Rust, & Lemon, 2001), we can infer that buyers who contribute large portions of firm's revenues may exhibit significant influence and constrain a firm's ability to profit. Such reliance on one or a few major customers for the bulk of revenues is known as *customer concentration or customer-base concentration* (Patatoukas, 2012).

Existing evidence suggests that an increase in customer-base concentration can have an adverse impact on organizations in areas such as equity cost of capital (Dhaliwal, Judd, Serfling, & Shaikh, 2016) and contracting costs with lenders (Campell & Gao, 2017). Saboo and colleagues (2017) report findings that corroborate with the evidence of adverse impact of an increase in customer-base concentration. They argue that with an increase in customer-base concentration, the bargaining power of buyers will increase while lowering the ability of the seller to negotiate, and thus effecting a selling firm's profitability. Demand for an extended credit period for payments and irregular purchases can further impact profitability when the buyers have the bargaining power (Fee & Thomas, 2004; Kelly, Lustig, & Van Nieuwerburgh, 2013).

Though research provides evidence in support of the claims that customerbase concentration will have an adverse impact on the selling firm's profitability, some evidence does exist to support that increase in customer-base concentration will create efficiencies and will assist in lowering transaction costs, thereby resulting in an increase in productivity (Ak & Patatoukas, 2016). For instance, the concentrated customer-base of a supplier firm allows the supplier to hold less inventory and experience fewer inventory write-downs (Ak & Patatoukas, 2016). When a few customers generate the bulk of revenues, the supplier firm can afford

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significant customer-specific investments that enhance its operational efficiency. The operational efficiency gained through inventory management could eventually promote a firm's profitability (Patatoukas, 2012).

Despite the efficiencies and the cost savings, the associated power the buyer gets from the increased dependence of the seller shifts bargaining power away from the selling firm (and more towards the buying firm). The coercive and exploitative behavior of buying firms when the buyer contributes to a significant portion of sellers' revenues casts doubts on the use of the positive outcomes of customerbase concentration. Based on the evidence, it is reasonable to argue that, despite an increase in the possibility to create efficiencies and cost savings, the shift in bargaining power due to the increase in the dependence for substantial revenues reduces the performance outcomes of the selling firm.

Hypothesis 1: A supplier firm's customer-base concentration is inversely related to its operating performance absent from M&As.

Customer Concentration and M&A Activity

Organizations that are dependent on their environment often attempt to reduce or minimize their dependence on the external environment (Pfeffer & Salancik, 1978). Organizations engage in M&As to reduce their interdependence with their suppliers or buyers (Pfeffer, 1972), where reducing organizational dependencies is the central goal of managers in pursuing M&As (Walter & Barney, 1990; Hillman et al., 2009). Specifically, firms that are dependent on a few customers for a significant portion of revenues (customer concentration) resulting in constraints, subsequent risks, and poor performance, initiate M&A to overcome limitations originating from customer-base concentration. Organizations that conduct M&As can recalibrate their dependencies and through the recalibration of dependences, organizations can overcome constraints which provides supplying organizations with an avenue to improve performance.

Therefore, the performance of organizations with concentrated-customerbase is dependent on the firm's ability to initiate M&As to overcome constraints and recalibrate their dependencies. Thus, we argue that M&A activity by a focal firm will moderate the relationship between customer-base concentration and the performance of the firm.

Hypothesis 2: *M&A activity will moderate the relationship between a firm's customer-base concentration and operating performance*

METHODOLOGY & RESULTS

Sample and Variable Measurement

A sample of High-Tech industry firms from COMPUSTAT between 2000 and 2013 was collected. While using Francis and Shipper (1999)'s method and defining high-tech industries based on three-digit SIC codes, the acquisition data was obtained from Thomson Reuters' SDC Platinum dataset. To be included in the acquisition sample, it is required that (i) the acquirer is a U.S. public firm listed on the NYSE, AMEX, or NASDAQ; (ii) the acquisition is a significant event (at least 5% of the acquirer's total market value); and (iii) the acquisition is not a crossborder transaction. In addition, serial acquirers (i.e., multiple acquisitions during our sample period) were removed to avoid confounding effects of prior acquisitions in our differences-in-differences test. After eliminating observations with missing information for the calculation of control variables, a sample of 12,038 observations were obtained for the test of acquisition likelihood.

FASB Accounting Standard Codification Topic 280 (ASC 280-10-50-42) requires a firm to disclose all major customers that account for 10 percent or more of its revenue. To estimate the measure of customer-base concentration, following prior studies (e.g., Patatoukas 2012; Dhaliwal et al. 2016) and calculating the Herfindahl-Hirschman Index of customer-specific sales revenue disclosed under ASC 280:

Customer Concentration_{it} =
$$\sum_{j=1}^{J} \left(\frac{Sales_{ijt}}{Sales_{it}}\right)^2$$
 (1)

By construction, this concentration measure is influenced by the number of major customers and the relative importance of each major customer reflecting a firm's diversification strategy related to its customer base. For example, an acquisition of new major customers would lower the concentration measure by increasing the denominator and reducing the revenue reliance on existing customers. Notably, Cohen and Li (2016) find that supplier firms having the United States government as a major customer experience a more transparent information environment and lower demand uncertainty. Since these benefits may offset the threat of highly concentrated customer-base, we also measured our customer concentration measure after removing the U.S. government from the list of major customers. The definitions of the variables included in the analysis are provided in *Table 1*.

Table 1Variables Description

Variable	Description
ROA	A ratio of operating income to total assets
CUST_HH	The measure of customer base concentration defined as the Herfindahl-Hirschman Index of a firm's sales revenue. Calculated as the sum of the squares of the sales shares to each major customer.
POST_ACQ	An indicator variable equals 1 if a firm engages in a merger & acquisition and 0 otherwise
FIRMSIZE	Log of total assets
LIQUIDITY	The ratio of operating cash flows to total assets
LEVERAGE	The ratio of the book value of short-term and long-term debts to total assets
GROWTH	Percentage of annual sales growth
AGE	Age of the acquiring firm

Data Analysis and Results

A preliminary analysis was conducted to examine the descriptive statistics (provided in *Table 2*) of the variables under consideration. In addition, a correlation matrix was constructed (provided in *Table 3*), that demonstrates the correlations among the independent and control variables range between 0.00 and 0.51 that is well below the cut-off limit of 0.7, indicating that there are no multicollinearity issues.

Variables	Ν	Mean	SD	Q1	Median	Q3
ROA	12,038	-0.3528	0.9865	-0.3771	-0.0857	0.0518
CUST_HH	12,038	0.1894	0.2333	0.0325	0.1007	0.2481
POST_ACQ	12,038	0.1095	0.3123	0.0000	0.0000	0.0000
FIRMSIZE	12,038	4.1971	2.2442	2.7317	4.1980	5.6110
LIQUIDITY	12,038	-0.1672	0.5231	-0.2241	-0.0035	0.0997
LEVERAGE	12,038	0.2761	0.6170	0.0000	0.0690	0.2907
GROWTH	12,038	0.3239	1.1546	-0.1236	0.0778	0.3456
AGE	12,038	2.3332	0.7280	1.7918	2.3026	2.8332

Table 2Descriptive of the sample

Table 3Correlation Matrix

Variables	1	2	3	4	5	6	7
1. ROA	1.00*						
2. CUST_HH	-0.20*	1.00*					
3. POST_ACQ	0.07*	-0.05*	1.00*				
4. FIRM SIZE	0.41*	-0.21*	0.07*	1.00*			
5. LIQUIDITY	0.64*	-0.24*	0.04*	0.51*	1.00*		
6. LEVERAGE	-0.45*	0.11*	-0.03*	-0.29*	-0.48*	1.00	
7. GROWTH	-0.15*	0.12*	-0.07*	-0.00*	-0.03*	-0.02**	1.00*
8. AGE	0.15*	-0.08*	0.11*	0.08*	0.12*	0.03*	-0.21*

p < .01. *p < .001.

To test the hypothesized relationship on the high-tech firm's operating performance changes after the completion of an acquisition attributable to its customer-base concentration, a differences-in-differences method (Bertrand & Mullainathan 2003; Low 2009) was used. Specifically, this study estimates the following regression model:

 $\begin{aligned} ROA &= \beta_0 + \beta_1 CUST_HH + \beta_2 POST_ACQ + \beta_3 CUST_HH * POST_ACQ \\ &+ \beta_4 FIRMSIZE + \beta_5 LIQUIDITY + \beta_6 LEVERAGE + \beta_7 GROWTH \\ &+ \beta_8 AGE + + Industry Fixed Effects + Year Fixed Effects + \varepsilon \end{aligned}$ (2)

As a summary measure of the acquirer's operating performance, this research uses the return on assets. The variable of interest is the interaction between customer concentration and the post-acquisition indicator, *CUST_HH* POST_ACQ*, which represents the incremental effect of customer concentration on ROA after the completion of an acquisition. Since an acquirer's operational profile can change significantly after the completion of an acquisition, *Industry Fixed Effects* –were included, *instead of Firm Fixed Effects* – in the differences-in-differences model to control for time-invariant unobservable factors affecting ROA. Furthermore, the use of firm fixed-effects is ruled out because our treatment variable, *POST_ACQ*, is a linear combination of firm fixed effects. These results are presented in *Table 4*.

As a validity check of the model, this study first tests whether the average effect of customer-base concentration is positively related to ROA. The results find that the joint coefficient of $CUST_HH + CUST_HH*POST_ACQ$ is positive and statistically significant at 5% level. This is consistent with Patatoukas (2012), confirming the efficiency benefits of customer-base concentration, on average. A test of our first prediction on the relationship between customer-base concentration and firm performance without M&As is captured by the negative and statistically significant coefficient of $CUST_HH$ (b=-0.1608) when all customers are considered; - 0.1678 for only non-government customers, showing that the suppliers having concentrated customer-base have lower ROAs without engaging in M&As.

The second prediction on the moderating role of M&As ameliorating the negative influence of customer-base concentration on the firm performance is tested with the coefficient of $CUST_HH*POST_ACQ$. The positive and significant coefficients (b= +0.399) of $CUST_HH*POST_ACQ$ suggest that the negative influence of customer concentration on ROA is changed into positive after the acquisition. With respect to its economic significance, this is equivalent to 68% lower level of ROA, on average, with one standard deviation lower customer concentration before the acquisition whereas 9.45% higher ROA level with one standard deviation higher customer concentration after the acquisition. The findings were consistent when only non-government customers were considered (b= +0.398). These findings support the theoretical conjecture of RDT hinting that a supplier firm experiencing revenue dependency to a few significant customers can use M&As as a strategic tool to mitigate the resource dependency.

Dependent = ROA	1	All Customers		Non-Gov	ernmental Cu	stomers
		Robust			Robust	
Variable	Coef. (b)	Std. Error	p-value	Coef. (b)	Std. Error	p-value
CUST_HH	-0.1608	(0.0617)	[600.0]	-0.1678	(0.0641)	[0.009]
POST_ACQ	-0.0081	(0.0189)	[0.668]	-0.0040	(0.0190)	[0.832]
CUST_HH*POST_ACQ	0.3998	(0.1137)	[0000]	0.3982	(0.1212)	[0.001]
FIRMSIZE	0.0430	(0.0048)	[0000]	0.0429	(0.0048)	[000.0]
LIQUIDITY	0.9049	(0.0383)	[0000]	0.9046	(0.0383)	[000.0]
LEVERAGE	-0.3180	(0.0346)	[0000]	-0.3183	(0.0345)	[000.0]
GROWTH	-0.0989	(0.0120)	[0000]	-0.0988	(0.0120)	[000.0]
AGE	0.0739	(0.0120)	[0000]	0.0732	(0.0121)	[000.0]
Constant	-0.4815	(0.0459)	[0000]	-0.4795	(0.0462)	[000.0]
Z		12,038			12,038	
Adj. R2		0.4724			0.4724	
Joint Test: CUST_HH + CUST_HH*POST_ACQ	0.2389		[0.018]	0.2304		[0.034]

Table 4

Customer Concentration and Post-Acquisition Return on Assets

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Test statistics are calculated using heteroscedasticity-robust standard errors clustered by firm.

GENERAL DISCUSSION AND CONCLUSION

This study has analyzed the impact of customer concentration on a firm's profitability. Through the lens of resource dependence theory, the study argues that as customer concentration increases, firms become more dependent on their significant customers. Such an increase in dependence will increase a customer's ability to constrain a dependent firm and thereby siphon away any joint benefits created by customer concentration. Furthermore, the firms that attempt to initiate M&As in the presence of high customer concentration benefit by improving profitability as opposed to firms that maintain a high dependence.

Earlier research on customer concentration maintained that there is value created by a strong customer base (Ak & Patatoukas, 2016; Patatoukas, 2012). This study reasons that such created value may be siphoned away by the more powerful firm in a buyer-supplier relationship when there is a high level of dependence. Findings in this study revealed that increasing dependence on one or a few significant customers is associated with lower profitability of the firm. This is true to such an extent that the overall increase in customer-base concentration has decreased the profitability of the selling firm. These findings are consistent with much of the earlier research on customer concentration (Fee & Thomas, 2004; Kelly, Lustig, & Van Nieuwerburgh, 2013; Saboo et al., 2017) and expand upon their observations. Furthermore, these findings support the fundamental tenets of resource dependency theory, which states that the dependence on an external entity in the firm's ecosystem constrains the firm and affects the performance of the firm (Pfeffer & Salancik, 1978; Hillman et al., 2009).

Although these findings imply that increasing customer concentration is associated with lower profitability of the supplier, our study does not refute the findings in earlier studies that claim an increase in customer concentration can increase operational efficiencies and can create joint benefits (Ak & Patatoukas, 2016; Patatoukas, 2012). The findings of this study are limited to highlighting the realized value for the supplier firm. The lower profitability associated with higher customer concentration indicates that increased dependence is likely to create unfavorable conditions to the supplier firm. The findings of this study also imply that organizations that attempt to overcome the constraints of a concentrated customerbase through acquisitions tend to improve their performance in contrast to those who do not reconfigure dependencies.

This study contributes by expanding upon research on customer concentration, providing empirical support to the key tents of resource dependence

theory, and clarifying some of the earlier findings in M&A research. The most important theoretical findings of this study are the demonstration of the relevance of resource dependence theory (RDT) to understand customer base concentration and the consequences of increased customer base concentration. The findings of this study provide empirical support to RDT's assertion that the more dependent a firm is on its transactional partners, the more constrained the firm tends to be, which is demonstrated by lower profitability associated with higher dependence. Furthermore, the findings also support the fundamental RDT assertion that when firms are constrained by dependence, firms tend to attempt to overcome the constraints through mergers and acquisitions. Moreover, these findings clarify an earlier position that a majority of M&As fail to create value for the acquiring firm (Cartwright & Schoenberg, 2006; King et al., 2004) and guide our understanding of the popularity of mergers and acquisitions as a form of corporate growth strategy.

This research is not free from limitations. First, we focus on customer concentration and dependence, and we do not differentiate between dependence and interdependence because of data limitations. Second, the acquisitions that are taken into account in the analysis do not distinguish between acquisitions initiated to circumvent the constraint or directed to absorb the constraint. Both these limitations were difficult to eliminate due to the limited availability of information via secondary data. Future research should attempt to both differentiate between dependence and interdependence and to identify the nature of acquisitions while differentiating between acquisitions directed at the constraining organization and those bypassing the constraint by acquiring a non-participant organization.

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