ACQUISITION STRATEGY CHOICE: INCIDENCE AND PRODUCT LINE SCOPE IN THE U.S. MEDICAL SECTOR

Will Mitchell* and J. Myles Shaver**

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* Professor of Corporate Strategy and International Business
  University of Michigan Business School
  Ann Arbor, MI 48109-1234
  email: wmitche1@umich.edu
  phone: 734 764 1230
  fax: 734 936 8716

** Associate Professor of Management and International Business
  Stern School of Business
  New York University
  44 West 4th Street, Suite 7-74
  New York, NY 10012-1126
  email: mshaver@stern.nyu.edu
  phone: 212 998 0430
  fax: 212 995 4221

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ABSTRACT

Using a routine-based perspective we examine: (a) which firms engage in acquisitions and (b) contingent on being an acquirer, which firms purchase product lines that they already operate (deepen their resources) versus product lines they do not operate (extend their resources). We predict that foreign firms and firms with greater existing product line scope are more likely to be acquirers. We hypothesize that firms with greater product line scope also are more likely to undertake resource-extending acquisitions. Finally, we expect foreign and domestic acquirers to have similar tendency toward resource extension and deepening, once we control for their propensity to undertake acquisitions. Data from the U.S. medical sector between 1978 and 1995 support our predictions with respect to which firms become acquirers. We find that the number of new product lines that firms acquire does not vary with their existing product line scope, but acquisitions by firms with greater product line scope have deeper ties into the firms’ existing product lines. Foreign and domestic firms have similar resource overlap tendencies. We discuss the implications that this pattern of firm choices has for understanding acquisition strategies and acquisition strategy outcomes.
Recent literature has emphasized the role of business acquisitions as strategic tools that firms use to change their resource profiles when they face market failures in discrete resource exchange (Nelson and Winter, 1982; Szulanski, 1996; Singh and Zollo, 1997; Karim and Mitchell, 2000). We expect that there exists heterogeneity in how firms use acquisitions as part of their change-related activities. We argue that firms with different national characteristics face differential market failures that affect their incentives to undertake acquisitions and firms with greater numbers of product lines possess differential absorptive capacities that affect their ability to undertake acquisitions. Our research contributes to the understanding of how firm capabilities influence firms’ acquisition strategy choices.

We investigate two related issues in this paper. The first issue is which firms become acquirers. The second is, given that certain firms become acquirers, under what conditions do they purchase product lines that they already operate (i.e., deepen their resources) rather than product lines in which they do not operate (i.e., extend their resources). We focus on business-level acquisition activities.\(^1\)

A routine-based perspective on business dynamics underlies our approach (Nelson and Winter, 1982; Winter, 1990; Mitchell, 2000). We develop four hypotheses. First, we predict that foreign-owned firms are more likely to be acquirers, because they face greater market failure for securing resources in host-country markets in ways other than acquisition. Second, we predict that firms with greater existing product line scope (i.e., operate more product lines) are more likely to be acquirers than firms with fewer product lines, because they have greater ability to absorb and manage acquired resources. Third, we hypothesize that acquirers that operate more

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\(^1\) Business-level acquisitions are acquisitions by single-business companies and by sector-specific business units of multi-business companies. That is, we focus on acquisitions that take place within a single business sector (empirically, in our case, the medical sector) of multiple-business corporations, rather than consider all acquisitions by firms that operate in multiple business sectors.
product lines *ex ante* are more likely to extend their resources. Again, our reasoning is that these firms have greater ability to absorb and manage acquired resources. Finally, we expect foreign and domestic acquirers to have similar tendencies toward resource extension and deepening, controlling for the expectation that foreign firms are more likely to be acquirers.

We test the hypotheses by examining almost 2,600 firms operating in the U.S. medical sector over the period of 1978 to 1995. The data include 271 acquisitions, including a total of about 900 product lines at the target businesses. This empirical setting is particularly well suited to inform how firm differences affect acquisition strategy choices. The data capture a highly varied sample that is close to the population of firms and all acquisition activities in this sector. Moreover, the data allow us to measure the different product lines that firms offer with an unusually high degree of precision. Therefore, we can make detailed assessments of the businesses that each firm operates and acquires. We find support for our hypothesis that foreign-owned firms are more likely to be acquirers. Consistent with our expectation, we also find that resource deepening and resource extension do not vary between foreign-owned and domestic firms. Also consistent with our hypothesis, we find that firms that offer a larger number of product lines *ex ante* are more likely to be acquirers. Contrary to expectation, we find that greater existing product line scope does not affect resource extension, but does lead to resource deepening.

The paper proceeds in the following manner. The next section details our hypotheses. The following section describes the data and the empirical estimation approach. The subsequent section presents the results. The final section discusses the implications that our findings have for better understanding acquisition strategies and acquisition strategy outcomes.
THEORY

We use a routine-based perspective on business dynamics as the conceptual basis for our study (Karim and Mitchell, 2000). The routine-based perspective draws most directly on work from the resource-based view of strategy (Penrose, 1959) and behavioral and evolutionary views of the firm (Cyert and March, 1962; Nelson and Winter, 1982; Cohen and Levinthal, 1990), along with key ideas from ecological (Hannan and Freeman, 1984) and transaction cost theories (Williamson 1999). Routines are identifiable patterns of activity embodied in human or capital assets (Nelson and Winter, 1982; Dosi, Marengo, and Fagiolo, 1996; Winter, 1990). Routines consist of multiple related transactions that take place over time either within a firm or via interaction with external parties. Routines are often tacit, either because they are intrinsically uncodifiable or because they require the interactive participation of multiple people. Several routines combine together to create particular resources. Resources, which we view as synonymous with the term capabilities, are stocks of knowledge, skills, financial assets, physical assets, human capital, and other tangible and intangible factors (Wernerfelt, 1984; Amit and Schoemaker, 1993). Empirically, we will use product lines as the operational measure of resources in our discussion of acquisitions, as we describe later in the paper, with the assumption that different product lines require different sets of routines.

Firms with different characteristics face different incentives and constraints on their use of acquisitions. To understand the role of acquisitions in business change, therefore, we need to understand how different firm characteristics influence the frequency and nature of acquisition activity. We focus on firm nationality and product line scope as explanatory factors, because these characteristics capture important ways by which firms’ incentives and abilities to change their capabilities through acquisitions vary. Variance in these two factors arises in almost all
industry and national settings. In almost all industries, foreign-owned and domestically-based companies compete for the same customers. Similarly, competitors have different product line scope in almost all industries.

Our premise is that in business environments that are changing due to technology and demand conditions, firms will have to deepen or extend the resources that they posses at any point in time in order to continue to be competitive. Moreover, firms have choices in how to change their resources that include internal development, acquisitions, and alliances.

We hypothesize that foreign-owned firms are more likely to be acquirers than domestically-based companies because foreign firms face greater difficulty accessing resources in a host-country through methods other than acquisition. We couch part of the discussion in terms of U.S. firms and firms based in other countries, owing to our empirical context in the U.S. market, but the arguments apply to firms operating in many technologically-advanced host markets.

Consider, first, internal development as an alternative to acquisition for foreign-owned firms. Foreign firms will often be less likely to develop resources internally in a host country market than their domestic competitors, especially in technologically-intensive and regulatory-intensive industries. Theories of foreign direct investment argue that foreign firms face disadvantages in a host market because they lack information and experience about the local business environment (e.g., Buckley and Casson, 1976; Zaheer, 1995). In order to sell products in a national market, firms often need to combine technological capabilities with capabilities in marketing and dealing with regulators. Foreign-owned firms are often less competent in developing these latter host-country specific capabilities internally, compared to domestic firms, because they lack fine-grained understanding of the host country context (Hennart and Park,
1993). This problem will be particularly salient in host markets of countries that have strong technical skills. For example, in our empirical context, U.S. firms have a technological comparative advantage. Technology often diffuses slowly across national boundaries (Kogut, 1991) and foreign firms operating in a host-country often face difficulty in accessing tacit technological knowledge that has developed within that country (Shan, 1997). Thus, foreign-owned firms will tend to be disadvantaged relative to their domestically-based competitors in developing resources internally that they need to compete in the host market.

Foreign firms also tend to face greater difficulty accessing resources through strategic alliances or joint ventures compared to domestic firms. Evans, Lane and O’Grady (1992) highlight how information disadvantages often restrict foreign firms from identifying and forming relationships with new buyers and suppliers. The complications associated with managing relationships with partners can often be confounded by factors such as distance, language, and culture (Buckley and Casson, 1988). Moreover, such confounds are likely to push strategic alliance or joint venture contracts outside of what Klein (1988) terms the self-enforcing range. Due to such expected difficulties, a transaction between two domestic firms is more likely to lead to a strategic alliance or joint venture compared to the same transaction between a foreign and domestic firm. In the latter case, the greater chance of breaching of the self-enforcing range increases the expectation of *ex post* contractual difficulties and thereby increases the benefits of integration (Klein, 1988). All else equal, a foreign-owned firm will have greater difficulties finding and transacting with partners compared to domestic firms.

In addition, theories of joint ventures and alliances argue that firms entering such agreements will often possess different but complementary capabilities (Nakamura, Shaver, and Yeung, 1996; Dussauge, Garrette, and Mitchell, 2000). In the international context, a common
way in which firms achieve such complementarities is that one partner provides technological skills and the other provides market access or host-country specific capabilities (Caves, 1996:78). Due to the level of country-specific regulation in the medical sector, market access capabilities are especially important in our empirical context and domestic firms will have greater capabilities regarding the local market. Moreover, due to the comparative advantage of domestic firms in this industry, they will also be more likely to have underlying technological skills. Therefore, it is less likely that a foreign-firm would trade technological capabilities for market access in a strategic alliance or joint venture compared a U.S.-owned firm. Should an alliance be formed to combine complementary technological skills, again we would expect that given the comparative advantage in this sector, U.S.-based firms are more likely have sought-after technologies.

Because alternative modes are less likely to facilitate the procurement of resources by foreign firms, we hypothesize that foreign firms will be more active acquirers. Although the firms will often face difficulties in integrating acquired businesses from the host-country within their business operations, these difficulties will often be less than the corresponding difficulties of acquiring discrete resources for internal development or managing alliances (Hennart, 1991). The advantage of acquisitions is that the new owners are better able to take direct control of integrated acquired resources and the firms’ existing resources (Hennart and Park, 1993). The prediction is consistent with a stream of research in international business showing that foreign firms often do not have the ability to build resources internally but attempt to acquire them from firms currently operating in the United States (Kogut and Chang, 1991). Moreover, the prediction is consistent with descriptive data of foreign entry into the United States, which show that acquisitions are more prevalent than greenfield investments or joint ventures (e.g.,
Formally stated, we hypothesize the following.

**Hypothesis 1:** Foreign-owned firms are more likely than domestically-owned firms to become acquirers in a host country market.

The second factor of interest with respect to which firms become acquirers relates to firm differences in the ability to absorb and effectively manage acquired resources. This argument relates closely to Cohen and Levinthal’s (1990) concept of absorptive capacity, that is, the idea that a firm’s experience conditions its capacity to use and integrate particular types of knowledge. We assess a firm’s ability to absorb and effectively manage the acquired resources by its existing product line scope. Multi-activity firms must develop capabilities to manage their extensive operations (Chandler, 1962). Such capabilities result from the combination of organization structure, operating systems, and managerial expertise (Penrose, 1959). The number of product lines that a firm offers within a business area is a key indicator of this capability.

We expect firms with greater numbers of product lines to be more likely to have the organization structure, operating procedures, and skills to effectively integrate acquired operations than more focused firms. Barnett and Freeman (1997) argue that the variety of a firm’s production and coordinating routines will increase with the number of product lines it offers. Kekre and Srinivasan (1990) and Lancaster (1990) show that the ability to manage disparate activities increases with the number of product lines that a firm offers. Consistent with these arguments, Dowell (2000) uses product lines to measure resource diversity and Karim and Mitchell (2000) show that post-acquisition product line retention increases with the number of lines that an acquirer possesses. We expect that firms with more existing product lines have greater ability to absorb acquired operations and, in turn, are more likely to undertake acquisitions.

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2 Foreign firms may have difficulties identifying and assessing acquisition targets compared to domestic firms but
Hypothesis 2: The greater a firm’s product line scope, the more likely the firm is to become an acquirer.

We also examine whether acquirers place greater or lesser emphasis on resource deepening or resource extension acquisitions. By resource deepening, as we noted earlier, we mean using acquisitions to acquire resources that are similar to current resources (Karim and Mitchell, 2000). Resource extension occurs when acquirers obtain targets’ resources that are distinct from their own. In the foreign direct investment literature, the term “asset seeking” is commonly used to describe this form of expansion (Wesson, 1999).

We expect resource extension to increase with an acquirer’s existing product line scope. The prediction derives from the argument that a firm’s ability to manage multiple existing activities increases its ability to integrate acquired product lines in which it does not currently operate. As we discussed above, firms with many product lines tend to develop organizational structures and systems to deal with multiple heterogeneous resources. Firms with more limited product line scope would tend not to have such capabilities. Karim and Mitchell (2000), for instance, show that post-acquisition retention of resource extension product lines increases with acquirer product line scope. The greater ability to manage integration of new types of resources leads to the following hypothesis.

Hypothesis 3: The larger an acquirer’s existing product line scope, the greater the firm’s tendency toward resource extension.

This hypothesis might appear to suggest that firms with more product lines will become larger without bound, because they are more likely to engage in acquisitions and engage in resource extension. Such unbounded expansion is unlikely, however, because firms often divest existing lines of business after acquisitions. Moreover, firms will tend to reach some point at which there is a large market of acquisition intermediaries, including consulting firms and investment banks.
which they choose not to add more lines because of the difficulty in managing many diverse activities. For this reason, the empirical analysis will examine whether the hypothesized relationship is positive yet decreasing, either monotonically or non-monotonically.

We base Hypothesis 3 on the argument that greater ability to manage integration of new types of resources will influence resource extension strategy. It is possible, though, that even firms that *ex ante* face difficulties in managing resource integration will undertake resource extension acquisitions if there are few growth alternatives available – preferring to take the risk of post-acquisition integration problems rather than remaining locked in their existing activities. Therefore, the test of Hypothesis 3 helps determine whether and how integration ability shapes acquisition strategy choice.

Turning to our final prediction, we expect no difference between foreign-owned and domestic firms with respect to product line deepening or extension. Our reasoning is that domestic firms that undertake acquisitions will tend to have the same constraints as foreign firms in adding resources through methods other than acquisition. That is, all firms choose acquisitions when internal development or joint ventures are less suitable ways to enhance resources, whether they are foreign-owned or domestically-owned. Although we expect that foreign firms will be more likely to become acquirers, we expect that the domestic firms that choose to become acquirers do so for similar reasons. Therefore, domestic and foreign firms will face similar needs for resource extension and resource deepening acquisitions as means of reconfiguring their businesses. This final hypothesis is a null hypothesis, in that we predict no effect of the independent variable on the dependent variable. We state the relationship formally to highlight our expectation.

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3 We recognize that an underlying arithmetic relationship works in opposition to our hypothesis. By chance, the greater the number of product lines, the more likely that overlap occurs with any acquisition. We are mindful of this
Hypothesis 4: Foreign-owned acquirers and domestically-owned acquirers have similar tendency toward resource extension and resource deepening.

In summary, the hypotheses address the likelihood that firms with different characteristics will be acquirers and then consider whether the acquisitions will emphasize resource extension or resource deepening. We expect acquisition activity to increase with foreign-ownership, owing to differences in market failure for other modes of business change that domestic and foreign firms face. We also expect acquisition activity to increase with firms’ product line scope, owing to greater ability to integrate and manage target businesses. For this reason, we also argue that greater product line scope will lead to a greater propensity of resource extending acquisitions. Finally, we expect domestic and foreign acquirers to follow similar acquisition strategies, once we take account of the factors that cause them to be acquirers in the first place. This final prediction suggests that there is a common logic underlying the strategies of domestic and foreign-owned firms, rather than a marked divide between “international” strategy and “domestic” strategy. The hypotheses address two important and common firm characteristics that influence firms’ incentives and constraints for their use of acquisitions.

DATA AND EMPIRICAL APPROACH

We test these hypotheses by examining a sample of firms that approaches the population of companies that participated in the U.S. medical sector between 1978 and 1995. The data source that we use is The Medical and Healthcare Marketplace Guide (1975, 1978, 1983, 1986, 1989, and each year after until 1995). These guides identify virtually every firm of any appreciable size that was operating in the U.S. medical sector, including U.S.-owned and foreign-owned businesses. The data source provides operating information for many privately-held companies, for which comparable data does not exist from other sources, as well as for arithmetic relationship in the empirical analysis.
publicly-held corporations. The guides provide extensive information regarding the firms’ medical sector product lines. The guides identify 258 product lines from five sub-sectors: medical devices (184 lines), dental devices (5 lines), ophthalmic devices (7 lines), pharmaceutical products (16 lines), and healthcare services (46 lines). These data provide an unusually fine-grained set of information about firms’ acquisition activities.

We construct the sample from all firms operating in 1978 and 1983 and then examine their acquisition activities through 1995. We focus on two years of baseline activity to increase the number of firms that we can examine. The sample includes 2,589 firms, with 1,211 firms that were operating in 1978 and an additional 1,378 firms that entered the data set by 1983. We focus on these years for two reasons. First, we choose 1978 as the base year because we were then able to use information from the 1975 guide to calculate control variables for \textit{ex ante} business activity and industry growth. Second, focusing on these two baseline years provides a more consistent window over which to examine firm actions than if we include a greater number of years.

\textbf{Dependent variables}

The first dependent variable that we examine is whether or not a firm becomes an acquirer. The variable, which we label ACQUIRER, takes the value of 1 if a firm engaged in at least one acquisition from the beginning of the study period through 1995, zero otherwise. The value of this variable was determined from data in \textit{The Medical and Healthcare Marketplace Guides} over various years. Of the 2,589 firms that form the sample, 216 engaged in acquisitions. Because some firms in our sample engaged in multiple acquisitions, the total number of acquisitions that we examine exceeds the number of companies that became acquirers. Our sample includes 271 acquisitions. Table 1 presents descriptive statistics for all variables.

\textbf{********** Table 1 about here **********}

In order to measure the degree of resource deepening and resource extension in the 271
acquisitions, we evaluate the extent to which acquired product lines matched a firm’s existing product lines. The basis for this measurement is the following. Our theory argues that routines combine together to create resources. We believe this difference in resource use is reflected in the unique product lines and services that the firms offer. A firm producing two different product lines is either using two different sets of routines to create those product lines (where some of the routines may be common to both product lines) or similar sets of routines that are combined differently. In the latter cases, routines may have different linkages between them that create combinations. If two firms produce the same product line, we assume that there is substantial similarity in the routines that underlie the product line. Therefore, our contention is that there is more similarity between routines of the same product lines from different firms as compared to different product lines from different firms.

We defined three related variables to test the resource extension and deepening predictions for these acquisitions. We refer to these variables as NEW LINES, EXISTING LINES, and OVERLAP. NEW LINES records the number of acquired lines that do not match the existing product lines of the acquirer. EXISTING LINES records the number of acquired lines that match existing product lines of the acquirer. We calculate OVERLAP by subtracting NEW LINES from EXISTING LINES. Positive values of OVERLAP indicate resource deepening because, in net, the acquirer purchased more product lines in which it operated than in which it did not operate. Negative values of OVERLAP indicate resource extension because the acquirer purchased more product lines in which it did not operate than in which it operated. The average value of OVERLAP is -1.47. That is, on average, firms are in net extending by approximately one and a half product lines with each acquisition. The range of deepening and extension is large, in that the maximum value of OVERLAP conveys a net deepening of 5 lines.
and the minimum value conveys a net extension of 24 lines.

**Independent variables**

We measure nationality of a firm with a dummy variable that indicates if the company is a foreign company or not. We label this variable FOREIGN, which takes a value of one if the company is foreign-owned, zero if U.S.-owned. These data are gathered from *The Medical and Healthcare Marketplace Guide* and other secondary sources. Of the 2,589 observations, approximately eight percent are foreign-owned.

To measure the product line scope of a company, we count the number of product lines that it operates. We label this variable NUMBER OF LINES. The average number of lines in which a company operates is 2.25. The range is very large. Some companies are very focused and operate in only one line. One company in our sample operated 43 lines in the baseline year.

**Control variables**

In addition to the two independent variables of focal interest, we also collected several variables to control for other factors that can affect our dependent variables. First, we measure the size of the company. This variable captures the size of the company’s sales in the medical sector ($ millions, in constant dollars based on the 1982 Producer Price Index). We label this variable SIZE. The descriptive statistics in Table 1 reveal that we assign some companies zero values for sales. In most cases, zero sales reflect that a company exists with a product line but

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4 When coding the values of the independent variables associated with ACQUIRER, we use the values at the point the firm enters the sample. We do so in order to restrict the sample to one observation per firm. This helps assure that we have independence across observations, which is an important assumption of the multivariate technique that we employ. When coding the values of the independent variables associated with OVERLAP, we use the values at the point in time just prior to the acquisition. We do this to provide the best estimate of firm characteristics prior to the acquisition. It is for this reason that the maximum value for NUMBER OF LINES is 43 in the data where we examine ACQUIRER, and 56 in the data the we examine OVERLAP. In this case the firm with 43 lines at the time it entered the sample grew to 56 lines before it made an acquisition later in the sample period.

5 Medical sector sales correlated highly with total corporate sales for the firms that we were able to gather total corporate sales data. Due to the extensive coverage of private firms in the data set, we were unable to gather total sales data for many firms.
with sales levels that are so low that the data sources do not record the sales. In a few cases, zero sales represent companies that have products that are awaiting regulatory approval and have not yet recorded sales.

We also control for whether or not a firm entered the medical sector initially by acquisition. The variable ENTER THE SECTOR BY ACQUISITION takes the value 1 under this circumstance, zero otherwise. We include this control for two reasons. First, firms undoubtedly make acquisitions for reasons in addition to the ones that we have hypothesized. If a firm entered the sector by acquisition for one of these reasons and if these motivations still exist, then these firms will more likely be acquirers and this variable will capture this effect. In other words, this variable helps capture the existence of unobserved heterogeneity in determining the acquisition decision and provides additional confidence that the independent variables that we test capture their intended effect. Second, behavioral or inertial forces might create a momentum with respect to acquisition activity (Amburgey and Miner, 1992).

We also include a variable to control for the effect of competition. To measure the variable COMPETITORS, we calculate the number of companies that operate in each firm’s product lines. For companies that operate in more than one product line, we average the values across lines. Table 1 indicates that the companies in the sample faced as few as one competitor and as many as 182 competitors.

Finally, we wish to control for growth in the product lines that a firm operates. Ideally we would like to measure change in total product line sales, but data do not exist at that level of disaggregation. For this reason, we measure the change in the number of firms that participated in a product line in the previous period. Once again, for firms that operate in multiple product lines, we average this value across lines to create the variable PRODUCT LINE GROWTH. In
our sample, we observe that some companies operate in product lines where the number of participants is contracting; the minimum value of this variable is -0.44. We also observe that many companies are participating in product lines that are growing; the mean value for this variable is 2.81 and the maximum value is 20.2. This positive mean growth level demonstrates that the healthcare sector grew over this period.

**Statistical Approach**

We have two dependent variables of interest: whether or not a firm becomes an acquirer and the degree of resource extension and deepening by firms that made acquisitions. Given that we only observe the latter dependent variable for the set of firms that chose to make acquisitions, we follow Heckman’s (1979) two-stage sample selection estimation approach. This approach explicitly recognizes the conditional nature of the comparison in the second stage thus allowing for more meaningful interpretation of the coefficient estimates. Shaver (1998) provides a more complete description of the benefits in using such techniques in strategy research.

Conceptually, we can think of our investigation in the following manner. Firms assess the expected value of engaging in acquisitions or not. We can define a variable ACQUIRER* as the difference in expected value of engaging in acquisitions versus not engaging in acquisitions. This latter category includes developing resources internally, developing resources through alliances, or doing nothing. As researchers, we cannot observe or measure the value of ACQUIRER*, but we can infer that it is greater than zero by observing whether or not firms undertake acquisitions. This is the standard formulation of a dichotomous choice model and is represented in equation 1.

\[
ACQUIRER_{i}^{*} = \gamma w_{i} + u_{i} \\
ACQUIRER_{i} = 1 \text{ if } ACQUIRER_{i}^{*} > 0, \text{ 0 otherwise} \quad [1]
\]

Based on our hypotheses, we expect that the underlying expected value of acquisitions is a function of several variables, which from the vector w. Moreover, effects that we do not
hypothesize or control for in \( w \) are captured by an error term, which we label \( u \) and assume has a normal distribution. The normality assumption results in a probit specification for the dichotomous choice model. Therefore, we test hypotheses 1 and 2 with a probit specification.

Hypotheses 3 and 4 examine how product line scope and nationality affect \( \text{OVERLAP} \). The standard approach would be to estimate a regression model of the following form.

\[
\text{OVERLAP} = \beta' x_i + \epsilon_i
\]  

[2]

Because we observe \( \text{OVERLAP} \) only for firms that make acquisitions, we are concerned that the conditionality of the relationship might lead to misleading estimates of \( \beta \). In particular, this will occur if there are factors that are unmeasurable or unknown that affect both the decision to become acquirers and the degree of overlap of the businesses that firms acquire. Under these conditions, the estimates of \( \beta \) will not have desirable statistical properties because the error terms in equations 1 and 2 correlate. The approach suggested by Heckman is to control for the potential correlation of the error terms by adding a term into the model in equation 2 that accounts for the correlation in error terms across equations, and then to correct the standard errors to account for heteroskedasticity. We, therefore, estimate a model of the form:

\[
\text{OVERLAP} = \beta' x_i + \beta \lambda + \eta
\]  

[3]

where \( \lambda = \phi(\gamma' w_i)/\Phi(\gamma' w_i) \).

In equation 3, \( \phi \) and \( \Phi \) are the probability density function and cumulative distribution function of the standard normal distribution. \( \eta \) is an error term with zero mean, but it is heteroskedastic and not normally distributed. The correction of the standard errors accounts for the existence of heteroskedasticity in the error term to create asymptotically efficient standard errors. For a more complete description of the estimation of sample selection models, see Heckman (1979) and Greene (2000).
RESULTS

Table 2 presents the results from the first stage probit specification. The results support hypothesis 1. We find that foreign-owned companies are more likely to engage in acquisitions than U.S.-owned companies, as evidenced by the positive and significant coefficient estimate of FOREIGN. Because probit is a non-linear estimator, coefficient estimates do not convey marginal effects, which depend on the values of the independent variables. We find that at the mean level of the set of independent variables, foreign-owned firms are five percent more likely to engage in acquisitions compared to domestic firms. The magnitude of this effect is large, considering that just over eight percent of the sample firms engage in acquisitions.

********** Table 2 about here **********

We also find support for hypothesis 2 in Table 2. The coefficient estimate of NUMBER OF LINES is positive and significant. As we predict, firms with greater product line scope are more likely to become acquirers. The magnitude of the marginal effect at the mean of the independent variables is two percent. This indicates that for each additional product line, firms are two percent more likely to become acquirers.

Turning to the control variables, we observe that three of the four coefficient estimates differ significantly from zero. First, the positive and significant coefficient estimate of SIZE indicates that larger firms are more likely to become acquirers. Controlling for size provides us with additional confidence that our variable NUMBER OF LINES captures the scope of a firm’s activities, which is the foundation of our hypothesis generation, rather than simply being an effect of firm size. The magnitude of the marginal effect is such that a firm of mean size is just over one percent more likely to become an acquirer compared to a firm with negligible sales.

Second, we found a positive and significant estimate of ENTER THE SECTOR BY ACQUISITION. Here the marginal effect is large. Firms that entered the medical sector by
acquisition are nineteen percent more likely to engage in acquisitions compared to firms that did not enter the sector by acquisition. Because this variable might proxy for the existence of unmeasured effects that increase the propensity to acquire, the positive and significant coefficient estimate is expected. Moreover, the inclusion of this control increases the confidence that FOREIGN and NUMBER OF LINES capture the underlying hypothesized effects.

Third, we also find a positive and marginally significant affect of COMPETITORS, suggesting that firms that face more competitors are more likely to engage in acquisitions. Consistent with the relatively low level of statistical significance, we find that the marginal affect is very small. At the mean value of this variable for the sample, firms are less than one percent more likely to become an acquirer versus those that had no competitors. Finally, we find no evidence that greater entry into a firm’s product lines affected its propensity to engage in acquisitions because the coefficient estimate of PRODUCT LINE GROWTH is insignificant.

Table 3 reports the results with respect to the resource deepening and extension predictions (Hypotheses 3 and 4). In column 1, OVERLAP serves as the dependent variable. As we stated in the hypotheses section, it is possible that the relationship between OVERLAP and NUMBER OF LINES is non-linear. For this reason we include the square of NUMBER OF LINES as an independent variable.

**Table 3 about here**

Overall, the fit of the model in column 1 of Table 3 is poor. The F-test is non-significant indicating that the independent variables add little explanatory power beyond the intercept. The coefficient value of the intercept is -1.74 and significant. Consistent with the variable means in Table 1, this suggests that, on average, acquisitions are resource extending.

The results in column 1 of Table 3 do not support hypothesis 3, which expected resource extension to increase with product line scope. The coefficient estimates of NUMBER OF LINES
and its square are not significant. Sensitivity analyses that dropped the squared term also showed no significant effect with respect to NUMBER OF LINES (neither the raw value of the variable nor the log of the variable). Together, these results suggest that product line scope has no significant influence on the net extent to which firms deepen and extend their product lines.

One explanation that might at first seem plausible concerning the null relationship between NUMBER OF LINES and OVERLAP is that the relationship is purely arithmetic. Because the total number of product line categories is fixed, a company with more product lines is more likely to overlap with an acquired line. If this arithmetic tendency toward resource deepening and a countervailing managerial effect toward resource extension simultaneously exist, we might observe no effect for the independent variable. This arithmetic constraint is unlikely in this empirical setting, given the large number of potential lines (258) relative to the maximum number of lines at any one firm (56). Nonetheless, we further investigate this possible arithmetic interpretation later in the analysis.

Consistent with hypothesis 4, the coefficient estimate FOREIGN does not have a significant effect on target-acquirer resource overlap. That is, the data provide no evidence that foreign firms differentially extend or deepen their product lines with acquisitions, compared to U.S.-owned firms. None of the other control variables have significant coefficient estimates.

Finally, we find that the selection coefficient is non-significant in column 1. Non-significant coefficient estimates of the selection correction are sometimes difficult to interpret. One interpretation is that a selection effect does not exist. Another possibility is that the effect exists; yet the variable $\lambda$ correlates with another independent variable or independent variables. The resulting multicollinearity inflates the variance of the individual coefficient estimate and drives the non-significant finding. In this case, however, the overall F-test is not affected.
Because the overall F-test of the model is non-significant we can rule-out this latter explanation and interpret the non-significance of the coefficient estimate as the lack of a selection effect.

To further investigate the extent of resource deepening and extension in acquisitions, we break OVERLAP into its components, NEW LINES and EXISTING LINES, and examine them separately. As we noted earlier, NEW LINES measures the number of lines that a target possessed that the acquirer did not possess before the acquisition (i.e., the degree of resource extension). In parallel, the EXISTING LINES variable records the number of lines that a firm and its target shared at the time of the acquisition (i.e., the degree of resource deepening). The value of this refined analysis is that it allows us to focus directly on firms’ resource deepening and extension tendencies as distinct choices, rather than pooling the choices into a net tendency as the OVERLAP variable does. Again we use the sample selection approach to account for the fact that we only observe the dependent variables if a firm engages in an acquisition.

NEW LINES serves as the dependent variable in column 2 of Table 3. As in the first column, the F-test is non-significant, indicating that, beyond the intercept, the independent variables add little explanatory power concerning resource extension. The overall non-significance of the model combined with the observation that firms, on average, acquire about two lines of business that they do not previously operate suggests that firms find acquisition strategies well suited to extend their product lines.

None of the independent variables in column 2 of Table 3 is statistically significant. We find that the coefficient estimates of NUMBER OF LINES and its square are non-significant (NUMBER OF LINES also had no effect when we removed the squared term). These results

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6 We recognize that these dependent variables are counts and that we might obtain more efficient estimates from using count regression models. Estimates from the least-squares estimator are unbiased and the adjustment of the error term corrects for heteroskedasticity that can stem from count dependent variables. We examined the results
provide evidence that NUMBER OF LINES is not simply capturing an underlying probabilistic arithmetic relationship. If such a relationship drove the results, we would expect NEW LINES to decrease as NUMBER OF LINES increases, because a company that has more product lines has fewer opportunities to acquire a line in which it does not already operate.

In column 3 of Table 3, where EXISTING LINES serves as the dependent variable, we find that the model is statistically significant, based on the F-test. With respect to the individual coefficient estimates, four are statistically different from zero. The coefficient estimate of NUMBER OF LINES is positive and significant. In addition, the coefficient estimate of NUMBER OF LINES$^2$ is negative and significant. Together, these estimates indicate that EXISTING LINES increases with number of lines but at a decreasing rate.

The non-monotonic relationship of resource deepening with NUMBER OF LINES again helps rule out the probabilistic alternative explanation for the results. Although a positive relationship between NUMBER OF LINES and EXISTING LINES would be expected by chance, the effect would be linear - not non-linear as we observe. Therefore, we have further evidence that our results do not simply reflect an underlying arithmetic relationship.

We need to interpret the meaning of the non-monotonic relationship carefully. Given the magnitude of the coefficient estimates in column 3, the maximal impact of NUMBER OF LINES is at 32 lines. Although the maximum occurs well within the range of the values of acquirers’ NUMBER OF LINES (56 lines), 95 percent of all observations have values below 32 lines. For this reason, we hesitate to draw inferences regarding the portion of the curve after the maximum. The net effect of NUMBER OF LINES on the dependent variable does not take negative values within the observable range. Its value is 0.11 for a firm with one product line, 1.82 at the maxima,

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using an approximation of the Poisson model for sample selection suggested by Greene (1995). We found results that are consistent with those presented.
and 0.56 for a firm with 56 product lines. Therefore, we emphasize the positive, yet decreasing marginal effect of NUMBER OF LINES.

The results in columns 2 and 3 of Table 3 support hypothesis 4. As expected, we find that foreign-owned and US-owned firms are equally likely to purchase resource extension lines (column 2) and resource deepening lines (column 3).

Two size-related control variables in column 3 have significant influences on resource deepening. The larger the acquirer (SIZE), the less likely it was to acquire existing lines. By contrast, the larger the target (TARGET SIZE), the greater the resource deepening. These results suggest that resource deepening tendencies decline with acquirer size, possibly because larger firms have greater ability to generate similar new resources internally. At the same time, acquirers appear to seek larger targets for resource deepening opportunities, possibly because the larger targets offer greater increase in scale of existing activities.

Finally, we observe a positive yet non-significant coefficient for the selection correction in column 3 of Table 3. Given the overall significance of the model, we cannot conclude that a selection effect does not exist. In fact, based on the estimate in column 3, the estimated correlation between the error terms of the probit specification in Table 2 and the specification in column 3 of Table 3 is 0.16. This is much larger than the correlation estimates between the probit and the specifications in columns 1 and 2, which are both 0.03. The positive correlation exhibited in column 3 suggests that there exists an unobservable effect associated with increased probability of becoming and acquirer and increased number of existing lines that a firm acquires.

Viewing the results across columns in Table 3 leads to the following interpretation. The lack of significance of the independent variables in columns 1 and 2 suggests that all acquirers tend to engage in resource extending acquisitions, as evidenced by the sign and magnitude of the

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7 Sensitivity analyses that omit the squared term indicate a positive and significant effect of NUMBER OF LINES.
intercept and by the mean values of the dependent variables. Moreover, the extent of resource
extension in these acquisitions does not systematically vary with the independent variables that
we include in the specification, which include product line scope, nationality, size, and growth in
the underlying product line. Therefore, in this sample, acquisitions are a strategy that firms with
many characteristics commonly use to extend their product lines. In turn, this suggests that firms
commonly attempt to use resource extension acquisitions in order to grow, even if they might
face post-acquisition integration problems. A possible explanation for this tendency is that
alternative means to obtain new types of resources, such as internal development, face even
stronger barriers than those that might arise from post-acquisition problems.

A more detailed examination of acquisition activity then suggests that firms with greater
product line scope are more systematic in making such acquisitions that also tie into their
existing lines of business. This is evidenced by the results in column 3 of Table 3. This
relationship does not show-up when OVERLAP is the dependent variable (column 1), because
resource extension is so prevalent in firms’ acquisitions. Therefore, although many firms engage
in resource extension, firms with more product lines are more systematic in acquiring lines that
also tie into their existing resources.

Alternatively stated, we find that firms with greater product line scope tend to
simultaneously extend and deepen their resources with acquisitions. However, firms with smaller
product line scope tend to extend their resources with acquisition but are less likely to deepen
their resources with acquisitions. We investigated whether the factor driving this observation was
that firms with more product lines tended to acquire more lines overall, that is, they undertook
larger acquisitions, but found that this was not the case.

In summary, we find systematic effects that support our hypotheses that foreign firms and
firms with greater product line scope are more likely to become acquirers. We also find that many firms in our sample use acquisitions to extend resources, and that the propensity to do so does not vary by product line scope, nationality, or firm size. Resource extension is pervasive in the sample, while firms with greater product line scope are more likely to make acquisitions that tie into their existing lines.

**CONCLUSION**

Our contribution in this paper is the systematic analysis of which firms become acquirers and, contingent upon becoming an acquirer, when does a firm purchase product lines it did not previously operate. We hypothesized that foreign-owned firms were more likely to become acquirers compared to domestically-owned firms because they face greater difficulty in acquiring resources through internal development or through joint ventures and alliances. We also hypothesized that firms with greater product line scope are more likely to become acquirers and would more likely engage in resource extending acquisitions, because they possess greater ability to absorb and effectively manage acquired resources. Finally, we expected foreign and domestic acquirers to have similar tendencies toward resource extension and deepening, controlling for the expectation that foreign firms are more likely to be acquirers.

The results support our hypotheses concerning acquisition likelihood. We find that the propensity to acquire is greater for foreign-owned versus domestic-owned firms. We also find that firms with greater product line scope were more likely to be acquirers. Because we control for firm size in the estimation, this result highlights that greater product line scope measures an enhanced ability to absorb and manage resources rather than capturing a size effect. Together these results suggest a systematic pattern regarding which firms engage in acquisitions.

These results demonstrate that the propensity to enter into acquisitions reflects both firm
strengths and weaknesses. The possession of resources that enhance a firm’s potential to absorb and manage product lines reflects a corporate strength. The inability or difficulty to develop resources internally or through alliances reflects a corporate weakness. Therefore, the varied outcomes of acquisitions that we often observe might reflect the great heterogeneity in firms that undertake this strategy.

With respect to resource deepening and extension, we find that with each acquisition companies, on average, acquired about one and a half product lines in which they did not previously operate. Thus, companies commonly used acquisitions to extend the resources that they possessed. In addition to this observation, some firms used acquisitions to purchase product lines in which they already participated, thereby deepening existing operations.

We found that product line scope did not systematically affect resource extension. On average, all firms in the sample engaged in resource extending acquisitions. However, we found that acquirers with greater product line scope were more likely to make such acquisitions that in addition to extending their resources also had greater overlap to their existing operations. What is interesting about this result is that firms with greater product line scope, and potentially greater ability to integrate and manage new resources, are more systematic in making acquisitions that have ties into their current business offerings. To the extent that these firms have superior skills at managing and integrating acquired product lines (e.g., Karim and Mitchell, 2000), the choice to make acquisitions that have a greater tie into their existing operations might be an important element in the successful integration of the acquired operations. In parallel, the results might suggest that firms with limited product line scope do not have the ability or luxury to wait and find the most suitable acquisition targets compared to firms with more lines. These underlying selection processes could help account for observed differences in the performance outcomes of
“related” versus “unrelated” acquisitions.

Finally, we find that foreign-owned firms engage in resource extension (*i.e.*, asset seeking) at the same rate as U.S.-owned firms. This result is interesting in the light of recent discussion in the international business literature. Asset-seeking motivations of foreign investment have recently been a topic of considerable interest (*e.g.*, Eun, Kolodny, and Scheraga, 1996; Anand and Kogut, 1997). We see an opportunity in better integrating the research from this literature into the broader corporate strategy literature. Moreover, our results suggest that asset-seeking behavior is just as common in domestic acquisitions as in cross-border acquisitions. This observation helps inform international business research because it suggests that asset-seeking behavior is not uniquely a foreign investment issue. Therefore, the implications and policy recommendations of asset-seeking foreign direct investment might need to be re-considered given the generality of this activity.

In conclusion, our findings highlight that there exist selection processes by which firms choose to undertake acquisitions and choose to acquire product lines that they did not previously operate. We identify two determinants of this selection process (*i.e.*, nationality and product line scope) that vary in most industry and national settings. Obtaining insight into these selection processes is key to fully understanding acquisition strategies. Because we demonstrate that certain firms undertake acquisitions, properly assessing acquisition strategy choice of overlap of existing and acquired businesses requires the insight that only firms with certain characteristics undertake acquisitions. Moreover, acquisition outcomes will tend to reflect the attributes of the companies that select certain strategies versus outcomes of the strategies *per se*. Our findings can guide further assessment of these issues.
Table 1 Correlation Matrices and Descriptive Statistics

<table>
<thead>
<tr>
<th>Resource deepening and extension (n=271)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. OVERLAP</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. EXISTING LINES</td>
<td>-0.06048</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. NEW LINES</td>
<td>-0.92069</td>
<td>0.44525</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. TARGET – DOMESTIC</td>
<td>-0.02058</td>
<td>0.02673</td>
<td>0.02892</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. FOREIGN</td>
<td>0.05358</td>
<td>-0.0798</td>
<td>-0.07926</td>
<td>-0.40036</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. NUMBER OF LINES</td>
<td>0.06881</td>
<td>0.27217</td>
<td>0.0447</td>
<td>0.17051</td>
<td>-0.14783</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7. SIZE</td>
<td>-0.03062</td>
<td>-0.07609</td>
<td>-0.00228</td>
<td>0.11554</td>
<td>-0.12684</td>
<td>0.16601</td>
<td>1</td>
</tr>
<tr>
<td>8. TARGET – SIZE</td>
<td>0.05667</td>
<td>0.28951</td>
<td>0.06237</td>
<td>0.00311</td>
<td>-0.15763</td>
<td>0.21613</td>
<td>0.45394</td>
</tr>
<tr>
<td>9. COMPETITORS</td>
<td>0.03807</td>
<td>-0.02385</td>
<td>-0.04347</td>
<td>-0.18528</td>
<td>0.29934</td>
<td>-0.13688</td>
<td>-0.06765</td>
</tr>
<tr>
<td>10. PRODUCT LINE GROWTH</td>
<td>-0.01248</td>
<td>0.00237</td>
<td>0.01212</td>
<td>0.11191</td>
<td>-0.13829</td>
<td>-0.02831</td>
<td>0.01583</td>
</tr>
</tbody>
</table>

Mean  
Std. dev.  
Min.  
Max  

Table 2
PROBIT RESULTS - ACQUIRER
(t-statistics in parentheses)
[marginal effects evaluated at the mean level of the independent variables in square brackets]
Positive coefficient estimates indicate increased probability of being an acquirer.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t-statistic</th>
<th>Marginal Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-1.60***</td>
<td>(11.84)</td>
<td>[-0.19]</td>
</tr>
<tr>
<td>FOREIGN</td>
<td>0.34***</td>
<td>(2.79)</td>
<td>[0.05]</td>
</tr>
<tr>
<td>NUMBER OF LINES</td>
<td>0.13***</td>
<td>(9.85)</td>
<td>[0.02]</td>
</tr>
<tr>
<td>SIZE</td>
<td>2.33x10^-7***</td>
<td>(4.15)</td>
<td>[2.69x10^-8]</td>
</tr>
<tr>
<td>ENTER THE SECTOR BY ACQUISITION</td>
<td>0.90***</td>
<td>(5.59)</td>
<td>[0.19]</td>
</tr>
<tr>
<td>COMPETITORS</td>
<td>0.001*</td>
<td>(1.45)</td>
<td>[0.0001]</td>
</tr>
<tr>
<td>PRODUCT LINE GROWTH</td>
<td>0.00</td>
<td>(0.52)</td>
<td>[0.00]</td>
</tr>
</tbody>
</table>

χ²(d.f.) 227.37 (6)***
Pseudo R² 0.09

*** p <0.01, ** p < 0.05, * p < 0.10 (one tailed tests)

n = 2,589, number of observations where dependent variable = 1 is 216.
### Table 3
**REGRESSION RESULTS – RESOURCE EXTENSION AND DEEPENING**  
(t-statistics in parentheses; n=271)

<table>
<thead>
<tr>
<th></th>
<th>1. OVERLAP (Net resource deepening)</th>
<th>2. NEW LINES (Resource extension)</th>
<th>3. EXISTING LINES (Resource deepening)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-1.74* (1.28)</td>
<td>1.38 (0.91)</td>
<td>-0.36 (0.68)</td>
</tr>
<tr>
<td>NUMBER OF LINES</td>
<td>0.04 (0.58)</td>
<td>0.07 (1.03)</td>
<td>0.11*** (4.45)</td>
</tr>
<tr>
<td>NUMBER OF LINES²</td>
<td>-0.00 (0.20)</td>
<td>-0.001 (1.04)</td>
<td>-0.002*** (3.52)</td>
</tr>
<tr>
<td>FOREIGN</td>
<td>0.52 (0.89)</td>
<td>-0.59 (0.95)</td>
<td>-0.09 (0.43)</td>
</tr>
<tr>
<td>SIZE</td>
<td>-3.27x10⁻⁷ (0.99)</td>
<td>-2.56x10⁻⁷ (0.69)</td>
<td>-5.83x10⁻⁷*** (4.53)</td>
</tr>
<tr>
<td>TARGET - DOMESTIC</td>
<td>0.03 (0.04)</td>
<td>-0.07 (0.09)</td>
<td>-0.04 (0.14)</td>
</tr>
<tr>
<td>TARGET - SIZE</td>
<td>2.27x10⁻⁷ (1.18)</td>
<td>2.02x10⁻⁷ (0.94)</td>
<td>4.30x10⁻⁷*** (5.73)</td>
</tr>
<tr>
<td>COMPETITORS</td>
<td>0.00 (0.43)</td>
<td>-0.00 (0.30)</td>
<td>0.00 (0.24)</td>
</tr>
<tr>
<td>PRODUCT LINE GROWTH</td>
<td>0.00 (0.02)</td>
<td>0.00 (0.06)</td>
<td>0.00 (0.20)</td>
</tr>
<tr>
<td>λ (Selection effect)</td>
<td>0.09 (0.18)</td>
<td>0.12 (0.20)</td>
<td>0.21 (1.05)</td>
</tr>
<tr>
<td>R²</td>
<td>0.02</td>
<td>0.02</td>
<td>0.23</td>
</tr>
<tr>
<td>F (9, 261)</td>
<td>0.49</td>
<td>0.46</td>
<td>8.60***</td>
</tr>
</tbody>
</table>

*** p <0.01, ** p < 0.05, * p < 0.10 (one tailed tests)  
Note: “OVERLAP” = “EXISTING LINES” – “NEW LINES” (positive values equal net resource deepening)
REFERENCES


Dowell, Glen. 2000. A routine-based view of constrained organizational change: The impact of


