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

Will Mitchell* and J. Myles Shaver**

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*The Fuqua School of Business, Duke University
Durham, NC 27708-0120
email: Will.Mitchell@duke.edu
phone: 919.660.7994
fax: 919.681.6244

** Carlson School of Management, University of Minnesota
319 19th Avenue South, Room 3-424
Minneapolis, MN 55455
email: mshaver@csom.umn.edu
phone: 612 625 1824
fax: 612 626 1316

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ABSTRACT

We argue that firms differ in their integration capability, which is the ability to absorb and manage acquired businesses on an ongoing basis. This heterogeneity of integration capability across firms affects both the propensity of firms to enter acquisitions and the types of businesses that firms target in acquisitions. We argue that a firm’s integration capability will increase with the scope of its product lines. We then generate and test two hypotheses: firms with greater existing product line scope are more likely to be acquirers; and firms with greater product line scope are more likely to purchase product lines that they did not previously operate. Data from the U.S. medical sector between 1978 and 1995 support our predictions with respect to which firms become acquirers. In turn, though, we find that the number of new product lines that firms acquire does not vary with their existing product line scope. Rather, all firms that undertook acquisitions commonly used the acquisitions to purchase product lines that they did not previously operate. However, the extent to which firms made acquisitions that tied into their previous acquisitions increased with the acquirers’ product line scope. This pattern of firm choices in acquisition activities implies that firms with greater integration capability, as measured by product line scope, have greater ability to undertake acquisitions and, moreover, may be better able to target businesses that offer desirable integration conditions.
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Recent studies emphasize 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). However, firms differ in how they use acquisitions as part of their change-related activities. Recently, research has begun to argue that differences in firms’ integration capability, which is the ability to absorb and manage acquired business resources on a continuing basis, underlie many of the differences in acquisition strategy (Jemison and Sitkin, 1986; Collis and Montgomery, 1998; Helfat and Raubitschek, 2000). Although intuitively appealing, this argument has received little empirical attention and only initial conceptual development. We investigate two related issues that arise from differences in integration capability. The first issue is which firms become acquirers. The second is, given that firms become acquirers, under what conditions do they purchase product lines that they already operate rather than product lines they do not operate. We focus on business-level acquisition activities.

A routine-based view on business strategy underlies our approach (Nelson and Winter, 1982; Winter, 1990; Mitchell, 2000). We argue that firms with greater numbers of product lines possess greater integration capabilities. We then develop two hypotheses. First, we predict that firms with greater existing product line scope (i.e., operate more product lines within a business) are more likely to be acquirers than firms with fewer product lines, because they have greater ability to absorb and integrate acquired lines of business on an ongoing basis. Second, we hypothesize that acquirers that operate more product lines ex ante are more likely to purchase product lines that they currently operate. Our reasoning is that these firms have greater ability to undertake the intensive integration that such lines require.

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

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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.
to inform how firm differences affect acquisition strategy choices. The data capture a varied sample that is close to the population of firms and acquisition activities in this sector and 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 firms that operate a larger number of product lines \textit{ex ante} are more likely to be acquirers. In turn, we find that all acquirers commonly purchase product lines that they did not previously operate. Pushing the analysis further, the results then show that although all acquirers tend to extend into new product lines, the extent to which they purchase firms that also have tie into their existing product offerings increases with product line scope. Thus, the results suggest that firms with greater integration capabilities make acquisitions that allow them to expand their product line offerings while also making acquisitions that overlap with their existing lines.

The paper proceeds as follows. 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.

\textbf{THEORY AND HYPOTHESES}

To understand the role of acquisitions in business change, we need to understand how firm heterogeneity influences incentives and constraints regarding the use of acquisitions. In this paper, we focus on integration capability as a source of firm heterogeneity.

We expect that an important determinant of whether a firm engages in acquisitions is its ability to absorb and manage acquired product lines on a continuing basis. This ability is becoming known in the literature as a firm’s integration capability. Integration capability is an important determinant of acquisition strategies that is distinct from the resources involved in the underlying creation, production, and sale of a product. The concept of an integration capability arises in the literature in disparate but related ways. Helfat and Raubitschek (2000: 964) argue that integrative knowledge, which they define as “knowledge that integrates, or knowledge of how to integrate, different activities, capabilities, and products in one or more vertical chains,” is an important element in the co-evolution of capabilities and products. Collis and Montgomery (1998) argue that important elements to corporate advantage include not only the resources that determine what products a corporation offers, but also the corporation’s coordination and control
capabilities. Singh and Zollo (1997), meanwhile, argue that firms can develop post-acquisition management skills that facilitate their use of acquisitions. The conceptual literature on acquisition process, meanwhile, argues that firms differ in their abilities to plan and implement post-acquisition target integration, where integration requires momentum and inter-group coordination (Jemison and Sitkin, 1986; Haspeslagh and Jemison, 1991). Recently, a few empirical working papers have focused on the mechanisms through which firm can attain integration capabilities. Zollo and Singh (2000) and Zollo and Leshchinskii (2000) argue that integration capability involves two mechanisms – tacit routinization for repetitive tasks and explicit codification for relatively infrequent and complex tasks. Similarly, Puranam (2001) finds that firms can develop an integration capability that facilitates acquisition transactions.

We highlight the ongoing and recurring nature of integration that is central to these arguments. In the Helfat and Raubitschek (2000) approach, integrative knowledge works in a continuous feedback system with core knowledge, product sequencing, incremental learning, and step-function learning. Similarly, in other approaches, coordination and control are ongoing processes that help facilitate management of a system of interdependent parts. In a complementary discussion, meanwhile, Liebeskind (1996) notes that firms differ in their internal capabilities to safeguard their knowledge, which typically requires the ability to integrate various activities over time. Lubatkin, Schulze, Mainkar, and Cotterill (2001:353) note how it took “at least three years” for performance differences to become apparent between the products in the Nestlé/Carnation merger versus the RJR/Nabisco merger and that these differences persisted over time. Thus, in our view, integration capabilities involve more than that a one-shot action related to a specific acquisition. Rather, integration capabilities are ability to facilitate actions immediately after an acquisition and into the future.

We predict that integration capability is an important consideration for the acquisition of product lines, regardless of whether the acquired lines constitute existing or new products for the acquirer. Consider when a firm acquires a product line in which it already operates. Common motivations for making such an acquisition would be trying to increase market power and searching for efficiencies by combining acquired resources in order to achieve greater scale (e.g., Seth, 1990). In the market power case, integration efforts are necessary to coordinate the production, marketing and pricing efforts of the two firms in order to realize any market power advantages. To achieve efficiency gains, meanwhile, the acquirer must integrate the operations
of the original business and target firm. Therefore, under both motivations, integration efforts play an important role in facilitating acquisitions, both upon completion of the acquisition and in an ongoing basis. For instance, Capron, Dussauge and Mitchell (1998) show that a significant redeployment of assets in both directions commonly occurs in horizontal acquisitions, suggesting the importance of integration capabilities in horizontal acquisitions.

The importance of integration capabilities also arises with the acquisition of product lines that are new to a firm. Again, efficiency or market power motivations are relevant when acquisitions involve non-overlapping product lines. For example, firms might be trying to capture efficiencies in development, manufacturing, or marketing across shared portions of the value chain. Likewise, the goal of acquiring new product lines might be to capture monopoly rents at some point in the value chain. In addition, such acquisitions offer opportunities to innovate by recombining the acquired lines with other lines in order to produce new goods and services. Such recombination will require substantial integration and reshaping of existing and new product lines (Capron, Mitchell, Swaminathan, 2001).

In the preceding arguments, we expect that the presence of greater integration capability will lead to better-guided absorption and management, immediately after the acquisition and in the future. The assumption underlying our arguments is that of managerial intended rationality that seeks to better firm profits. Namely, managers will be more likely to undertake extensive acquisition activity if they believe that their firms have the integration skills needed to undertake the acquisitions effectively.

We recognize that acquisition activity sometimes stems from motivations that differ from the goal to increase firm profitability, such as empire building, (e.g., Jensen, 1986), hubris (e.g., Roll, 1986), or other agency motivations (e.g., Amihud and Lev, 1981). Nonetheless, the existence of these motivations does not invalidate our arguments. First, managers tend not to 'advertise' that acquisitions are made for self-serving reasons and have incentives to engage in actions that make it appear an acquisition did not occur solely for personal gain. These activities include efforts to integrate the jointly run the acquired company. The ability to do so would be dependent on integration capabilities. Thus, even acquisitions that stem in part from agency motives will be more feasible in firms that have strong integration capabilities. Second, all else equal, we expect that acquisitions will be more carefully scrutinized when made by companies that lack integration capabilities in order to verify that they are not made for agency reasons.
Under this condition, our prediction will still hold. Namely, firms lacking integration capabilities would be less likely to make acquisitions compared to firms that possess such capabilities. Nevertheless, to the extent that these explanations for acquisition activity are pervasive and effective monitoring is not related to integration capabilities, the data will reject our hypotheses, so that any bias is conservative. We further discuss agency motivations in the results section.

Operationally, we expect integration capabilities to associate with the number of product lines that a firm operates prior to making an acquisition. This is because firms that operate more product lines tend to have the organization structure, operating procedures, and skills to effectively integrate their multiple product offerings. Again, we note how this relationship describes the on-going nature of integration. Many arguments in the theoretical and empirical literature support this association. For example, Chandler (1962) argues that multi-activity firms develop capabilities to manage their extensive operations. Such capabilities result from the combination of organization structure, operating systems, and managerial expertise (Penrose, 1959). 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, Karim and Mitchell (2000) show that post-acquisition product line retention increases with the number of lines that an acquirer possesses. Moreover, the idea that a firm’s experience conditions its capacity to use and integrate particular types of knowledge parallels Cohen and Levinthal’s (1990) notion of absorptive capacity, which focused on how firms’ research activities affect their capacity to absorb knowledge from the environment. We discuss below how our data and variables make this operationalization especially relevant in our empirical setting.

In summary, we hypothesize that firms with higher levels of integration capabilities will be more likely to engage in acquisitions than firms lacking these capabilities. In turn, the number of product lines that a firm operates manifests such integration capabilities.

Hypothesis 1. The greater number of product lines that a firm operates, the more likely the firm is to become an acquirer in a given period.

We also examine what determines whether firms tend to acquire product lines that they operated prior to the acquisition (existing lines) or product lines that they did not previously operate (new lines). Above, we argued that integration capabilities are important whether a firm
acquires a new line or whether it acquires a product line it operated \textit{ex ante}. The following arguments refine this argument by reasoning that integration capabilities may be most important when a firm acquires product lines that it already operated prior to the acquisition.

We start by considering the degree of overlap of an acquirer’s existing business with acquired lines that it did or did not operate previously. It is useful to consider a business value chain that includes development, production, marketing, distribution, and administrative activities. Typically, there will be more overlap in the marketing and distribution aspects of the value chain when an acquirer purchases a product line that it already operates. We cannot predict whether there is more or less overlap in development or production capabilities when firms acquire product lines that they do and do not operate \textit{ex ante}, however, because different products often rely on similar technologies and manufacturing processes, while similar product offerings can draw on different technologies and manufacturing processes. Nor can we predict whether administrative activities will have greater or lesser overlap in the two types of cases. Nonetheless, so long as there is no greater overlap of capabilities in development, production, and administrative functions for new product lines than for existing lines, then acquisitions of new lines will have less overlap with the acquirer’s existing capabilities owing to the lesser overlap in marketing and distribution. In turn, new lines will require more integration efforts both initially and into the future in order to obtain equivalent levels of integration. Thus, if firms tended to undertake equivalent integration of new lines and existing lines with their existing businesses, we should expect to see that firms with greater integration capabilities are more likely to acquire lines that they do not already operate.

When one considers the utility of integration capabilities, however, it is necessary to consider both the difficulty of achieving equivalent integration of newly acquired product lines and the intensity of integration that an acquirer will need to undertake. Integration of lines that the acquirer already offers and lines that the acquirer did not operate before the acquisition will tend to vary on these two dimensions, of relative difficulty and intensity.

Consider acquiring lines that a firm did not operate before the acquisition. Reinforcing the point we made above, a firm would often face substantial difficulties if it were to undertake full-scale integration of such lines. Full integration often would require combining newly-acquired business units with existing business units that would tend to have highly different attributes and then adapting many types of business activities – including development,
production, marketing, distribution, and administrative systems – in order to fully integrate the new lines into the existing business.

Nonetheless, product lines extensions typically do not require full-scale integration for the acquirer to obtain value from the newly acquired lines. Instead, acquirers often use such acquisitions as a means of extending business activities into new areas and undertake only light-handed integration of the new lines with their existing businesses. Although obtaining value from the acquisition will require some degree of business integration, with the aim of creating greater joint value in the combination of existing and new businesses than in the prior independent operations, firms commonly expect to gain much of the post-acquisition value via the increased scope of goods and services that they offer, with only limited business integration. In such cases, newly acquired business units may well continue to operate as stand-alone subsidiaries for substantial periods, with only partial integration of activities such as marketing and distribution into the acquirer’s other businesses. Other business activities, such as development, production, and business unit administration may offer potential integration opportunities, but firms will often pursue these only gradually, if at all. Thus, although full scale integration of new lines would be difficult, so that it might seem that firms would need greater prevalence of integration capabilities in order to undertake acquisitions that emphasized new lines, the need for integration often is limited and firms can hope to undertake successful acquisition of new lines even if they lack a high degree of integration capabilities.²

By contrast, consider the integration of acquired lines that a firm already operates. When an acquirer buys a product line it already operates, there is by definition some overlap in the sales and marketing aspects of the value chain. Here, although the difficulty of integration might appear easier relative to new lines, the intensity of integration will tend to be greater. When a firm acquires lines that it already operates, much of the post-acquisition value will arise through increased economies of scale in development, production, marketing, distribution, and administration. In order to realize such scale economies, the acquirer will need to combine the acquired business unit with its existing business units and will need to consolidate many activities along the value chain. In turn, the acquirer will typically need to divest resources that

² One issue is that acquisition of new lines may tend to increase the complexity of a firm’s portfolio of resources, and so strain internal control systems (Hitt, Hoskisson, Johnson and Moesel, 1996). However, business divestitures also tend to increase with acquisition of new lines (Karim and Mitchell, 2000), which will help attenuate the complexity.
have become obsolete owing to the consolidation, where the divestitures will involve resources of both the target and existing businesses (Capron, et al., 2001). Such intense consolidation and rationalization requires substantial integration skill. The announcement in Fall 2001 that Hewlett Packard intended to purchase Compaq, for instance, met substantial skepticism in the financial markets because of doubts that the firms had the integration skill that they would required in order to consolidate and rationalize their overlapping products lines effectively and quickly.

Thus, we expect that the ongoing integration of existing lines will require greater integration capabilities than the integration of new lines because the firm will need to undertake more intense integration in order to realize the value of the acquisition. The following hypothesis follows from linking product line scope with integration capabilities.

**Hypothesis 2.** The larger an acquirer’s existing product line scope, the greater the firm’s tendency toward purchasing product lines it did already operated.

In summary, the hypotheses address how an important source of firm heterogeneity – the ability to integrate disparate business operations in an ongoing basis – affects the likelihood that firms will become acquirers and whether they will buy lines of business that they do or do not previously operate. We expect acquisition activity to increase with firms’ product line scope, owing to greater ability to integrate and manage target businesses. In turn, we predict that greater product line scope will lead to greater propensity to purchase product lines that the firm already operates. Thus, we expect that firms with the greatest integration capabilities will be most likely to make acquisitions and will also be more systematic in making acquisitions where they can best leverage their existing knowledge base, again paralleling Cohen and Levinthal’s (1990) absorptive capacity argument. This reasoning is analogous with the biological observation that the most successful predators are not only better able to overpower their prey, but are also better able to target prey against which they can most successfully employ their capabilities.

**DATA AND EMPIRICAL APPROACH**

We test the 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 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.

The product line definitions are precise. For example, several medical device product lines fall into one four-digit SIC classification (3845 – Electro-medical and Electro-therapeutic Apparatus). This precision is important given our arguments that product line scope measures integration capabilities. Our product definitions are able to pick up differences in markets, production technologies, or research base that would not be identifiable in many other data.

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{Focal 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 in the second stage of the analysis includes 271 acquisitions. Table 1 presents descriptive statistics for all variables.

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

We define three related variables to evaluate the extent to which acquired product lines matched a firm’s existing product lines. We label the variables NEW LINES, EXISTING
LINES, and NET 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 NET OVERLAP by subtracting NEW LINES from EXISTING LINES. Positive values of NET OVERLAP indicate that the acquirer purchased more product lines in which it operated than in which it did not operate. Negative values of NET OVERLAP indicate that the acquirer purchased more product lines in which it did not operate than in which it operated. The average value of NET OVERLAP is -1.47. That is, on average, firms are purchasing approximately one and a half product lines in which they did not operate with each acquisition. The range of the NET OVERLAP variable, however, is large, with a maximum value of 5 (more existing lines than new lines) and a minimum value of -24 (more new lines than existing lines).

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

**Control variables**

We collected several control variables. First, we measure the size of the company. This variable captures the size of the company’s sales in the medical sector (millions of 1982 dollars based on the 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 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. Size is an important

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3 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 NET 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 we examine NET 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.

4 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.
control given that we measure integration capabilities as the number of product lines that a firm operates and this variable might capture the impact of firm size.

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, 0 otherwise. We include this control for three reasons. First, firms undoubtedly make acquisitions for reasons other than their integration capabilities. If a firm entered the sector by acquisition for one of these reasons and if the motivation still exists, 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), which this control will also capture. Finally, to the extent that there is an experience effect that facilitates acquisitions (e.g., Fowler and Schmidt, 1989) controlling for entry into the sector by acquisition will help address this effect.

The next control that we include is whether or not the firm is based in the U.S. or in a foreign country. We label this variable FOREIGN, which takes a value of 1 if the company is foreign-owned, 0 if U.S.-owned. We include this control because the U.S. enjoys a comparative advantage in the medical sector compared to other nations and there is empirical evidence that foreign firms often acquire firms in a foreign country in order to gain access to capabilities that they might lack (e.g., Kogut and Chang, 1991). We gather the nationality data from *The Medical and Healthcare Marketplace Guide* and other secondary sources. Of the 2,589 observations, approximately eight percent are foreign-owned.

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 control for market growth in the product lines that a firm operates. We measure the change in the number of firms that participated in a product line in the previous
For firms that operate in multiple product lines, we average the number of competitors in each line 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 to which it purchases product lines that it already operated. 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. 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.

\[ \text{ACQUIRER}_{i}^{*} = \gamma w_{i} + u_{i} \]

\[ \text{ACQUIRER}_{i} = 1 \text{ if } \text{ACQUIRER}_{i}^{*} > 0, 0 \text{ otherwise} \]  

We expect that the underlying expected value of acquisitions is a function of several variables based on our hypothesis and controls and 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 with a probit specification.

Hypothesis 2 examines how product line scope affects NET OVERLAP. The standard

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5 Ideally, we would like to measure change in total product line sales, but data do not exist at that level of disaggregation. The growth in the number of firms is a reasonable alternative measure of
one-stage approach would be to estimate a regression model of the following form.
\[ \text{NET OVERLAP} = \beta'x_i + \epsilon_i \]  
[2]
Because we observe NET OVERLAP only for firms that make acquisitions, we are concerned that the conditionality of the relationship might lead to misleading estimates of \( \beta \) in the one-stage regression. In particular, this will occur if there unmeasurable or unknown factors 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. Heckman’s approach 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. Therefore, we estimate a model of the form:
\[ \text{NET OVERLAP} = \beta'x_i + \beta_\lambda \lambda + \eta \]  
[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 (Heckman, 1979; Greene, 2000).

**RESULTS**

Table 2 presents the results from the first stage probit specification. The results support hypothesis 1, which predicted that firms with greater product line scope are more likely to become acquirers. As we expected, the coefficient estimate of NUMBER OF LINES is positive and significant. Because probit is a non-linear estimator, the coefficient estimates do not convey marginal effects, which depend on the values of the independent variables. The table reports that 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. The magnitude of this effect is large, considering that just over eight percent of the sample firms engage in acquisitions.

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

whether a product area is growing or declining.
Turning to the control variables, we observe that four of the five coefficient estimates are significant. 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. 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 NUMBER OF LINES captures the underlying hypothesized effect.

Third, 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. 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. This is consistent with our expectation that the comparative advantage of the U.S. medical sector leads foreign firms to engage in acquisitions in order to access capabilities that reside in firms that operate in the U.S.

Fourth, 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 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. That is, the coefficient estimate of PRODUCT LINE GROWTH is insignificant.

Table 3 reports the results with respect to whether or not firms buy product lines that they operated \textit{ex ante} (Hypothesis 2). We estimate three models: first examining net overlap of new
and existing lines, then individually examining the number of new lines and existing lines that the firms acquired.

********** Table 3 about here **********

In column 1 of Table 3, NET OVERLAP serves as the dependent variable. We also include the square of NUMBER OF LINES as an independent variable, to check the possibility of a non-linear relationship. Overall, the fit of model 1 is poor. The R² is low (0.02) and 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, all acquirers purchase product lines that they did not previously operate.

The results in column 1 of Table 3 do not support hypothesis 2, which predicted that firms with greater product line scope are more likely to purchase product lines that they already operate. 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 does not provide a discriminating influence on the net extent to which firms purchase new and existing product lines.

In addition to the non-significant effect of the NUMBER OF LINES, none of the other control variables or the selection correction coefficient in column 1 of Table 3 has a significant coefficient estimate. 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, but the variable λ correlates with other independent variables. The resulting multicollinearity inflates the variance of the individual coefficient estimate and drives the non-significant finding. However, multicollinearity would not reduce the overall F-statistic. Because the overall F-test of model 1 is non-significant, we can rule-out the multicollinearity explanation and interpret the non-significance of the coefficient estimate as the lack of a selection effect.

To further investigate which product lines firms acquire, we break NET OVERLAP into its components, NEW LINES and EXISTING LINES. As we noted earlier, NEW LINES measures the number of lines that a target possessed that the acquirer did not possess before the acquisition. In parallel, the EXISTING LINES variable records the number of lines that a firm
and its target shared at the time of the acquisition. The value of this refined analysis is that it allows us to focus directly on firms’ choices to purchase product lines that they already operate and that they do not already operate, rather than pooling the choices into a net tendency as the NET 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 is 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. The overall non-significance of the model combined with the observation that firms, on average, acquire about 2.3 lines of business that they do not previously operate suggests that firms with many characteristics that undertake acquisitions often do so in order to add new product lines. The main discrimination, then, lies in which firms undertake acquisitions, which Table 2 showed to be firms with greater integration capabilities, rather than in which firms use acquisitions to acquire new lines.

None of the independent variables in column 2 of Table 3 is statistically significant. In particular, we find that the coefficient estimates of NUMBER OF LINES and its square have no effect on acquisition of NEW LINES (NUMBER OF LINES also had no effect when we removed the squared term).

Significant influences do emerge in column 3 of Table 3, where EXISTING LINES is the dependent variable. Here, we find that the model is statistically significant, based on the F-test. 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 (Sensitivity analyses that omit the squared term indicate a positive and significant effect of NUMBER OF LINES, which is consistent with the positive correlation between NUMBER OF LINES and EXISTING LINES in Table 1). Together, these estimates indicate that EXISTING LINES increases with number of lines but at a decreasing rate.

An alternative explanation that might at first seem appealing is that the positive impact NUMBER OF LINES on acquiring EXISTING LINES in column 3 simply reflects an underlying probabilistic arithmetic relationship. The concern is that because the number of

---

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...
product lines as defined by our data source is fixed, the more product lines that an acquirer operates, the greater the probability that it purchases one that overlaps by chance. However, two observations in Table 3 help rule out the probabilistic explanation. First, the probabilistic relationship would be linear. Namely, if a firm operates one product line and randomly buys into a product line the chance of overlap is $1/258$; if a firm operates 257 product lines and randomly buys into a product line the chance of overlap is $257/258$. By contrast, we observe a non-linear relationship in column 3, because the non-monotonic relationship we observe between NUMBER OF LINES and EXISTING LINES is increasing, but at decreasing rate. Second, the probabilistic relationship should also hold for purchasing new lines. That is, the more product lines a firm has, the less likely by chance it would be to purchase into a product line that it does not currently operate. If an arithmetic relationship drove the results, then, we would expect NEW LINES to decrease as NUMBER OF LINES increases in column 2. Thus, the null results in column 2 provide further reassurance that the relationships are not simply arithmetic. Therefore, the evidence suggests that our results do not simply reflect an underlying arithmetic relationship.

We need to interpret the non-monotonic relationship in column 3 of Table 3 carefully. Given the magnitude of the coefficient estimates, 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 remains positive within the observable range. Its value is 0.11 for a firm with one product line, 1.82 at the maximum, and 0.56 for a firm with 56 product lines. Therefore, we emphasize the positive, yet decreasing marginal effect of NUMBER OF LINES. This pattern is consistent with the argument that firms reach limits in their ability to use acquisition to obtain capabilities.

Two size-related control variables in column 3 have significant influences on product line overlap. 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 likelihood of overlap. These results suggest that existing-line acquisitions decline with acquirer size, possibly because larger firms have greater ability to generate similar new resources internally.

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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.
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 of Table 3, which are both 0.03. The positive correlation that column 3 reports suggests that there is at least a moderate unobservable effect associated with increased probability of becoming an acquirer, on the one hand, and increased number of existing lines that a firm acquires, on the other.

As a whole, the results across columns in Table 3 lead to the following interpretations. First, the lack of significance of the independent variables in columns 1 and 2 suggests an overall tendency for all acquirers to purchase product lines that they did not previously operate, as evidenced by the sign and magnitude of the intercept and by the mean values of the dependent variables. Moreover, this tendency 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, acquirers with many characteristics commonly use acquisitions to extend their product lines.

Second, a more detailed examination of acquisition activity suggests that firms with greater product line scope are more systematic in making acquisitions that also tie into their existing lines of business. The results when EXISTING LINES is the dependent variable (column 3) provide this implication. This relationship does not show up when NET OVERLAP is the dependent variable (column 1), because buying new product lines is so prevalent in all firms’ acquisitions. Instead, the result appears only when we disaggregate the new and existing product lines. Therefore, although all acquirers tend to purchase product lines that they did not operate ex ante, acquirers with more product lines are more systematic in making acquisitions that add to their existing lines. Although this tendency increases with product line scope it does so at a decreasing rate, which suggests that integration capability affects product line choice but the marginal impact of higher integration capability levels is smaller than lower capability levels.

In summary, we find contrasting acquisition tendencies for firms with greater or lesser product line scope. Acquirers with greater product line scope tend to purchase product lines that both extend and overlap their previous product offerings. By contrast, firms with smaller product
line scope primarily tend to purchase product lines that extend their previous product offerings. Therefore, it appears that firms with fewer product lines emphasize acquisitions that graft new businesses onto the existing organization. Firms with larger product line offerings also graft on new activities, but also may acquire businesses that have provide greater scale for their current businesses.

Given the pattern of results that we observe, coupled with the implications of other research, we believe that the results are consistent with the integration capabilities argument that underlies the hypotheses. In particular, it appears that firms with greater integration capabilities also pick targets that suit their capabilities.

The interpretation that integration capability affects what product lines a firm acquires is consistent with other research. Popular teaching cases on corporate strategy (e.g., Cooper Industries and Newell) highlight how companies that are adept at acquiring and continually integrating business are very systematic in the business that they acquire – especially with respect to how these businesses overlap with the existing corporation (Collis and Stewart, 1991; Collis and Johnson, 1994). Moreover, the corporate finance literature has focused on how target choice is an indicator for acquirer characteristics. For example, Morck, Schleifer and Vishney (1990) argue that unrelated acquisitions reflect agency behavior. Our interpretation parallels this argument, in that we find that firms with greater integration capabilities are more likely to undertake acquisitions that have direct ties to the existing businesses. Finally, we reiterate that the existing research we cited earlier is consistent with the interpretation that product line scope associates with integration capabilities.

_Alternative explanations:_

We examine several possible alternative explanations of the results. First, as we discussed earlier, we do not believe that an underlying arithmetic relationship drive the pattern of results with respect to whether acquirers purchase product lines that they previously operated. Both the non-monotonicity of the impact of NUMBER OF LINES in column 3 of Table 3 and the null results in column 2 are inconsistent with an arithmetic explanation.

A second alternative explanation is that product line scope captures firm size rather than integration capabilities. There are two reasons why we do not believe this to be the case. First,
we include controls for size in all specifications. Second, if size alone affected the propensity to acquire, we would also expect the probabilistic arguments of the relationship between product line scope and whether or not the firm acquired new lines of business to hold, because increased size would affect the probability of overlap. It does not.

A third explanation that initially appealed to us was that firms with more product lines might tend to acquire targets with more product lines. If so, then, there would be greater chance of overlap. In examining the data, however, we found no evidence of such a pattern.

Fourth, our arguments stem from the notion that firms enter acquisitions with the expectation of improving firm performance. However, other motivations exist and there is the possibility that product line scope captures these underlying motivations rather than integration capabilities. One such possibility is that acquisitions are made for reasons independent of expected profitability, so that the relationship between product line scope and the independent variables is spurious. There are two factors that we believe mitigate this argument. First, the strength of the product line results in the probit estimation makes it unlikely to be spurious. Second, the results in the estimation of product line overlap do not appear spurious (i.e., driven by a probabilistic relationship), as we discussed.

Fifth, building on the notion of other motivations, we also considered that possibility that greater product line scope reflects agency behavior rather than integration capability. Product line scope appears not to reflect agency behavior for the following reasons. First, we know of no theoretical relationship between product line scope and agency behavior. Yet, if product line scope measures agency behavior and agency motivations were prevalent in the sample, this would be consistent with the probit results. However, the finding that firms with greater product line scope systematically make acquisitions that tied more into their existing businesses is not consistent with agency arguments. This is because many agency arguments expect such agency-motivated acquisitions to focus on expansion into unrelated areas (e.g., Amihud and Lev, 1981; Morck, Schleifer and Vishney, 1990).8 We find no relationship between the number of product lines and the tendency to purchase new product lines and, moreover, do find evidence that these firms make acquisitions that better tie into their existing operations.

In summary, we find systematic patterns that support the hypotheses. Firms with greater

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8 This relationship has been called into question (see Lane, Cannella, and Lubatkin, 1998 and the discourse between these authors and Amihud and Lev in SMJ, November 1999).
product line scope are more likely to become acquirers. We also find that firms in our sample most often use acquisitions to purchase product lines that they do not currently operate, and that the propensity to do so does not vary by product line scope, nationality, or firm size. Firms with greater product line scope, while exhibiting this tendency to acquire product lines they did not operate \textit{ex ante}, also are more likely to make such acquisitions that tie into their existing product lines. This pattern of firm choices in acquisition activities implies that firms with greater integration capability, as measured by product line scope, have greater ability to undertake acquisitions and, moreover, may be better able to undertake the detailed integration required to gain economies of scale in existing product 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 or did not previously operate. We hypothesized that firms with greater product line scope are more likely to become acquirers. We also examine whether they are more likely to purchase product lines that they did or did not previously operate.

The results support our hypothesis concerning acquisition likelihood. We find that firms with greater product line scope were more likely to be acquirers. Because of the nature of our sample, the pattern of results, and the control variables that we include, we believe that this relationship captures differences in ongoing integration capabilities versus other factors.

With respect to whether or not acquirers purchased lines of business that they previously operated, we also find a systematic pattern. We find that with each acquisition companies, on average, acquired about 2.3 product lines in which they did not previously operate, whereas they acquired only about 0.9 lines that they already operated. Thus, acquirers more commonly used acquisitions to extend into new product areas, rather than to reinforce existing lines. In addition, we found that acquirers with greater product lines scope were the most likely to use acquisitions to purchase product lines in which they already participated. This is consistent with the interpretation that firms with greater integration capabilities are systematic in the firms that they acquire, as well as being more likely to be acquirers.

The study helps us gain an understanding about the underlying selection processes that occur with respect to acquisitions. Although we do not examine acquisition performance in this study, the selection processes that we highlight suggest implications for understanding
acquisition strategies and performance. First, examining which firms undertake acquisitions might help explain the great heterogeneity of acquisition outcomes because we find that acquisitions appear to be chosen by firms that possess and firms that lack capabilities. Our finding that product line scope affects acquisition likelihood is consistent with these firms possessing integration capabilities. In comparison, the finding that foreign firms are more likely to be acquirers is consistent with previous research that argues that foreign firms often make acquisitions to acquire capabilities that they lack and are located in a foreign country (e.g., Kogut and Chang, 1991).

Second, our findings regarding which firms acquire lines of business that they operate _ex ante_ might help account for observed differences in the performance outcomes of “related” versus “unrelated” acquisitions, if we view acquisition of existing lines as a refined form of related acquisition. Rumelt (1974) and several subsequent studies suggest that acquisitions that relate to a firm’s existing capabilities often outperform acquisitions that primarily involve new capabilities (Palich, Cardinal, and Miller, 2000). This result might arise if firms with stronger integration capabilities are systematically more likely to undertake more related acquisitions than firms with weaker integration capabilities, as we find here. If so, then the stronger performance of related acquisitions would flow more from the firms’ underlying capabilities than from the relatedness _per se_. Indeed, this suggestion speaks to the ambiguity in the findings concerning the relative performance of related and unrelated acquisitions. Although some studies report positive relationships between acquisition performance and relatedness (e.g., Singh and Montgomery, 1987; Shelton, 1988; Anand and Singh, 1997), several others report no main effect of relatedness on performance (e.g., Stillman, 1983; Eckbo, 1983; Chatterjee, 1986; You et al., 1986; Lubatkin, 1987; Fowler and Schmidt, 1989; Sirower, 1997). In reconciling this finding, part of the discourse in the literature has focused on the differences in measuring related versus unrelated expansion (e.g., Palich, Cardinal, and Miller, 2000). Our findings suggest another possible interpretation. Relatedness reflects internal firm capabilities as much or more as it reflects external measures of relatedness, and to the extent that studies control for important firm capabilities, such as integration capabilities, external relatedness might or might not exhibit a significant relationship with acquisition performance. Although conclusive evidence that selection drives the results is beyond the scope of this study, the implication provides fruitful ground for future research.
One last finding deserves comment. We find that foreign-owned firms purchase product lines that they did not operate at the same rate as U.S.-owned firms. This result is interesting in the light of recent discussion in the international business literature. It suggests that acquirers purchase capabilities that they do not possess is as common in domestic acquisitions as in cross-border acquisitions. Therefore, the implications and policy recommendations of foreign acquisitions might need to be re-considered given the generality of this activity.

In conclusion, our findings highlight the existence of selection processes by which firms choose to undertake acquisitions and choose to acquire product lines that they did or did not previously operate. We focus on one element of selection process (i.e., product line scope) that varies in most industry and national settings. Obtaining insight into acquisition selection processes is key to fully understanding acquisition strategies. Because we demonstrate that certain firms undertake acquisitions, assessing acquisition strategy choice of overlap of existing and acquired businesses requires the insight that firms with certain characteristics are most likely to undertake acquisitions. Moreover, the nature of the acquisitions reflects the attributes of the companies. Thus, although acquisitions clearly provide important vehicles that help businesses change, firms vary in their abilities to use acquisitions as part of their change-related activities.
### Table 1. Correlation Matrices and Descriptive Statistics

**Acquisition tendency (n=2589)**

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**Mean**

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**Std. dev.**

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**Max**

|       | 1       | 1       | 1.39x10^7 | 43       | 1         | 182     | 26      |

**Existing or new lines (n=271)**

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(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.

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</tr>
<tr>
<td>χ²(d.f.)</td>
<td>227.37 (6)***</td>
<td></td>
</tr>
<tr>
<td>Pseudo R²</td>
<td>0.09</td>
<td></td>
</tr>
</tbody>
</table>

*** 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 – Influences On Overlap Of Acquired Product Lines with the Acquirer’s Existing Lines
(t-statistics in parentheses; n=271)

<table>
<thead>
<tr>
<th></th>
<th>1. NET OVERLAP</th>
<th>2. NEW LINES</th>
<th>3. EXISTING LINES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-1.74 *</td>
<td>1.38</td>
<td>-0.36</td>
</tr>
<tr>
<td></td>
<td>(1.28)</td>
<td>(0.91)</td>
<td>(0.68)</td>
</tr>
<tr>
<td>NUMBER OF LINES</td>
<td>0.04</td>
<td>0.07</td>
<td>0.11 ***</td>
</tr>
<tr>
<td></td>
<td>(0.58)</td>
<td>(1.03)</td>
<td>(4.45)</td>
</tr>
<tr>
<td>NUMBER OF LINES²</td>
<td>-0.00</td>
<td>-0.001</td>
<td>-0.002 ***</td>
</tr>
<tr>
<td></td>
<td>(0.20)</td>
<td>(1.04)</td>
<td>(3.52)</td>
</tr>
<tr>
<td>FOREIGN</td>
<td>0.52</td>
<td>-0.59</td>
<td>-0.09</td>
</tr>
<tr>
<td></td>
<td>(0.89)</td>
<td>(0.95)</td>
<td>(0.43)</td>
</tr>
<tr>
<td>SIZE</td>
<td>-3.27x10⁻⁷</td>
<td>-2.56x10⁻⁷</td>
<td>-5.83x10⁻⁷***</td>
</tr>
<tr>
<td></td>
<td>(0.99)</td>
<td>(0.69)</td>
<td>(4.53)</td>
</tr>
<tr>
<td>TARGET - DOMESTIC</td>
<td>0.03</td>
<td>-0.07</td>
<td>-0.04</td>
</tr>
<tr>
<td></td>
<td>(0.04)</td>
<td>(0.09)</td>
<td>(0.14)</td>
</tr>
<tr>
<td>TARGET – SIZE</td>
<td>2.27x10⁻⁷</td>
<td>2.02x10⁻⁷</td>
<td>4.30x10⁻⁷***</td>
</tr>
<tr>
<td></td>
<td>(1.18)</td>
<td>(0.94)</td>
<td>(5.73)</td>
</tr>
<tr>
<td>COMPETITORS</td>
<td>0.00</td>
<td>-0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>(0.43)</td>
<td>(0.30)</td>
<td>(0.24)</td>
</tr>
<tr>
<td>PRODUCT LINE GROWTH</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>(0.02)</td>
<td>(0.06)</td>
<td>(0.20)</td>
</tr>
<tr>
<td>λ (Selection effect)</td>
<td>0.09</td>
<td>0.12</td>
<td>0.21</td>
</tr>
<tr>
<td></td>
<td>(0.18)</td>
<td>(0.20)</td>
<td>(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: “NET OVERLAP” = “EXISTING LINES” – “NEW LINES”
REFERENCES


