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ABSTRACT

Of 31 Canadian-based firms that entered 24 U.S. medical sector markets between 1968 and 1989, 21 continued to operate in 1991. Industry concentration and the U.S. market share held by foreign firms affected survival. Survival was longest in industries that were undergoing the transition from domestic to global status at the time of entry, suggesting that optimal entry timing is related to the state of globalisation of an industry.

INTRODUCTION

In the past two decades, we have become increasingly aware of the need to compete in the global markets (Prahalad and Doz, 1987; Bartlett and Ghoshal, 1989). In many industries, firms that attempt to survive in domestic niches will fail. Indeed, current economic policy in many countries, including Canada, focuses on the idea that domestic companies must compete in larger arenas. But while being a global player may often be profitable, becoming a global player is often risky. Mitchell, Shaver, and Yeung (1991, 1992) found that firms expanding their international presence often failed if their industries were already global. Increased international presence led to positive results if industries were globalising, hinting that the success of cross-country investment is affected by the degree of globalness in an industry at entry time.

In this paper, we examine 31 Canadian firms that entered medical sector markets in the United States between 1968 and 1989. Although recent analysis has been critical of Canadian capabilities to compete in global industries (Porter, 1991), the conclusion is based on a sweeping analysis of potential capabilities, with less attention to how Canadian firms fare when they venture across the border. In this study, we identify circumstances in which expanding Canadian firms succeeded. In particular, we test whether the extent of foreign presence in the relevant U.S. market at the time of entry was related to the firm’s survival in the United States. This work advances our general understanding of the links between successful expansion and industry conditions.

BACKGROUND

Mitchell, Shaver, and Yeung (1991, 1992) distinguished three types of international industry status: global, domestic, and transition. A global industry is one in which the "positions of competitors in ... national markets are fundamentally affected by their overall global positions" (Porter, 1980: 275). Major national markets of global industries include many foreign multinational firms, which often gain significant market positions. In a domestic industry, by contrast, global operations do not provide advantages to a firm so that national markets consist primarily of nationally-based competitors. Some industries are in transition from domestic to global (or, less often, the reverse), as changes in technology, markets, and other factors open the borders to international competitors.

We expect the success of international expansion to differ across global, transition, and domestic industries. The entrenched firms in industries that have already achieved global status have many advantages, including ties with customers and suppliers, and early-mover control of key resources. Although incumbents may be susceptible to challenges from new competitors if global technical, market, and regulatory environments change, newcomers that challenge well-established competitors in a global industry often will fail.
In transition industries, firms that are among the first to undertake international expansion may do very well. By definition, transition industries are those in which the advantages of international presence have only begun to emerge (or, at least, to be recognised). The earliest firms to gain access to international technology, position themselves in several markets with similar demands, and create links to foreign governments will often benefit. The early-movers will become the well-entrenched international competitors that put pressure on firms that expand only after the industry has become clearly identified as a global industry. In transition industries, we expect that the benefits of international expansion often will outweigh the disadvantages.

Possessing international operations in domestic industries provides few advantages, so that the disadvantages of international expansion will often outweigh the benefits. However, few industries are purely domestic. In many cases, a competitor in a primarily-domestic industry may improve its domestic performance by gaining focused access to international technology, labour, markets, tax arbitrage benefits, or other resources, following less encompassing expansion than in the case of a more-broadly global industry. The benefits of international expansion in domestic industries may balance or outweigh the disadvantages, but we do not expect the benefits to be as great as in transition industries.

This argument leads to the prediction that a firm’s success in a foreign market will have an inverted U-shaped relationship with the international status of the market at the time of entry: lower in domestic industries, higher in transition industries, and lower again in global industries. For this paper, we define success as continued operation in a market, or survival. Survival is relevant for policy makers, who must be concerned with the long-run ability of a firm to provide jobs and taxes. The measure is also relevant to strategists, who must consider the length of time available to recover sunk investments.

**DATA**

We tested the prediction by examining the entry of Canadian-based firms to the U.S. medical sector. The sector has undergone drastic changes since the beginning of the period covered by this study. In 1968, most medical markets in the United States were served primarily by domestic firms, although a few European firms (mainly German and British) had begun to cross the Atlantic. By 1991, many of the industries had begun the transition to global status, and a few had achieved global status. In the diagnostic imaging and pacemaker industries, for instance, foreign-owned firms accounted for more than 40% of sales in the United States in 1990. In the U.S. medical sector as a whole, increasing numbers of German and British firms have entered, the presence of Japanese competitors has grown from a few marginal players to now pass the British in numbers, and many other European, Asian, and Australian firms now compete. Nonetheless, some industries remain primarily domestic, particularly in the service sector. Therefore, the medical sector provides a useful framework within which to pose questions concerning entry to domestic, transition, and global industries.

We identified 34 companies based in Canada that entered medical sector markets in the United States between 1968 and 1989. We gathered data from a series of trade guides that list firms participating in the United States medical sector (Hale and Hale, 1975, 1978, 1983, 1986, 1989; Smith, 1990, 1991), the business press, and several phone conversations. By Canadian-based firms we mean public and private companies of which the majority ownership was held in Canada or, in two cases, the Canadian subsidiaries of European firms that did not yet do business in the United States.

We eliminated three entrants from the initial sample of 34, believing them to be primarily affected by issues outside the bounds of the study. Two firms were owned by Canadian government agencies that sold the businesses during the divestiture wave of the late 1980s, and
one firm made a minority investment in a U.S. pharmaceutical company. We believe the remaining sample of 31 firms accurately represents the experience of Canadian-based firms operating in the United States medical sector. We then determined whether the entrants were still operating in the United States in mid-1991, and identified exit dates for those that were no longer conducting business.

The 31 entrants in the sample operated in 24 different industries in the United States, including mechanical-based industries such as diagnostic imaging equipment and patient monitors, chemical-based industries such as blood and medical chemicals, and service industries such as nursing homes and retail pharmacies. The median entry year was 1982. Most firms were located in Ontario (14 cases) and Quebec (8), although others were based in British Columbia (4), Alberta (2), Manitoba (2), and Prince Edward Island (1).

Table 1 notes the number of entrants and exiters. The table also notes the method used to enter the United States and the type of exit, where known. Entry methods were about evenly split between acquiring existing U.S. businesses and setting up new businesses. Most of the exiting businesses disappeared, meanwhile, which in most cases is likely due to business dissolution.

********** Table 1 about here **********

Perhaps the most notable feature of the table is that more than two-thirds of the entrants have survived, and continued to operate in the United States in 1991. This in itself is a nontrivial degree of success. Canadian-based firms have done quite well after entering the United States, which is somewhat at odds with the notion that the Canadian industrial base in technologically-advanced sectors is weak.

We do not want to overstate the point that the Canadian industrial base is strong. Relatively few firms entered the United States in the 22-year period of our study (about the same number as entered from Sweden, but far below the number of German, British, and Japanese entrants). Moreover, few of the entrants have become leaders in the U.S. markets in which they now compete, although companies in the nursing home, laboratory testing, and retail pharmacy industries are among the strongest in the United States. From a public policy perspective, the small number of entrants from Canada and the tendency for them to remain followers indicates that the Canadian technological infrastructure needs to be stronger, in order to spawn more firms able to become world-class competitors.

ANALYSIS

We investigated influences on the length of time that the Canadian-based entrants survived. The dependent variable for this analysis is the number of years that a firm operated in the United States, with a additional 0-1 dummy variable indicating firms that continued to operate at the end of the study. We defined two independent variables to test the prediction: the share of the relevant United States market held by foreign firms during the year of the Canadian firms' entry, and the share squared. As we state in the following hypotheses, we expect low foreign share (domestic industry) to be associated with shorter survival, increasing foreign share (transition industry) with longer survival, and still greater foreign share (global industry) with shorter survival.

Hypothesis 1. Foreign share will have a positive relationship with survival.

1 Reviewing directories of medical equipment companies operating in Canada reveals few other Canadian-based firms that are likely to have entered the U.S. medical sector (Department of Industry, Trade, and Commerce, 1981; Hale and Hale, 1986).
Hypothesis 2. Foreign share squared will have a negative relationship with survival.

We also defined two independent variables to control likely alternative explanations. We recorded the four-firm concentration ratio in the year of entry, expecting that highly-concentrated industries would be harder to penetrate successfully. We defined a 0-1 dummy variable to record service industries, expecting that Canadian firms would be at a disadvantage in the United States service sector, where detailed customer knowledge often is necessary (Lane and Hildebrand, 1990). Table 2 lists the variables, product-moment correlations, and summary statistics.

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

To identify the relevant industries, we used classifications reported by the trade guides. In 19 cases, the guides reported distinct markets (e.g., patient monitors), including the market shares held by significant U.S.-owned and foreign players. We calculated the foreign market share and concentration ratio directly for these industries. In the other 12 cases, the guides reported product classifications rather than distinct markets and listed the participants, but not the market shares. We treated the product classifications (e.g., spectrophotometers) as industries. We then estimated foreign market shares and concentration ratios based on the number of foreign and U.S.-based participants and their apparent strength in written descriptions of the firms' activities. To check for bias, we estimate separate models for the two subsamples, as we will report shortly. Canadian entrants participated in more than one industry in two cases, where we selected the primary industries based on the written description of the firms' activities.

We used accelerated event-time loglinear maximum-likelihood regression to analyse the data (Kalbfleish and Prentice, 1980; Cox and Oakes, 1984), using Proc Lifereg of the SAS statistical package (SAS Institute, 1988). With this technique, one specifies a baseline parametric distribution and then estimates the influence of independent variables as loglinear additions and subtractions (accelerators and decelerators in a linearised model) from expected survival if all independent variables were equal to zero. The technique controls observations that have not exited by the end of the study, as is true of almost 70% of our cases. The control is effected by using the survival length of observations that have not exited to calculate a survival function and the participation length of exiting cases to calculate a probability density function of the specified underlying parametric distribution. We used the loglogistic distribution, which captures the nonmonotonicity that is commonly found in studies of organisational exit (few early exits, followed by many mid-range exits, succeeded by relatively few exits once the mid-range period has passed).

The regression models take the form: \( \ln(T) = \beta X + \sigma \varepsilon \). In this equation, \( \ln(T) \) is the natural logarithm of the observed length of survival, \( X \) is a matrix of independent variables, \( \beta \) is a coefficient vector (including an intercept), \( \varepsilon \) is a vector of parametrically distributed error terms, and \( \sigma \) is a variance-related scale parameter of the distribution.

RESULTS

Table 3 reports the results of the analysis. Both models -- column 1 with only cases for which foreign share was known, and column 2 including estimated foreign shares -- explain significant portions of the overall variance, as shown by the \( \chi^2 \) statistics at the foot of the table. The first model increases the loglikelihood of a baseline model containing only intercept and

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2 In the 12 estimated cases we judged domestic, transition, and global industry status and then assigned foreign market share of 5, 25, and 50 percent, respectively. We also judged fragmented, moderate, and highly-concentrated status and then assigned four-firm concentration measures of 12, 37, and 60 percent, respectively.
scale parameters by a substantially greater degree than the second model, as shown by the "loglikelihood explained" proportions, which suggests that our concentration and foreign share estimates may not be fully accurate.

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

In the model with known shares (column 1), foreign share and share squared took statistically-significant positive and negative signs, as predicted in the hypotheses (the decimal placement of the coefficients was shifted, as indicated in the table, in order to report meaningful figures). The effect on survival of foreign share at the time of a Canadian firm's entry was initially positive, increased as foreign share rose to about 16.4%, then declined thereafter and became negative at about 32.8%. These figures are within the empirical scope of foreign share at the time of entry, which ranged from 1% to 36% in the sample (see Table 2). With 1% foreign share, the baseline distribution was multiplied by a factor of about 1.1. At the maximum value of foreign share, the baseline distribution was multiplied by a factor of about 2.4.

The results reported in column 1 yield interesting interpretation. A firm may benefit by entering a foreign market even when the market is primarily domestic (foreign share is very low), but there may be advantages to waiting until the market begins to make the transition to global status (foreign share is moderate). Foreign participants in domestic industries face several problems. Some industries remain domestic and never undergo transition, so that a foreign entrant continually operates at a disadvantage relative to domestic firms, owing to its more complex and costly multinational organisational structure. The foreign firm may be forced to withdraw from the national market of the domestic industry.

Even in domestic industries that undergo transition to global status, very early foreign entrants may make major mistakes from which they cannot recover (Crossan, Lane, and Hildebrand, 1991). If foreign firms that are waiting in the wings learn from the mistakes of the pioneers about the pitfalls of operating in a particular national market, the later movers may be able to enter successfully when a domestic industry begins the transition to global status. In any case, firms that wait to enter until the industry has achieved global status will often fail because the earlier movers have captured most global advantages.

Among the control variables in column 1, increasing concentration had the expected negative effect. A four-firm concentration ratio of 50 decelerated the baseline distribution by a factor of about .5. This is an assurance that our results for the foreign share variables are not caused by entry barriers posted by industry leaders in concentrated industries.

We were somewhat surprised to find that Canadian firms have competed successfully in the U.S. service sector, with no discernable difference between service and other industries. The obvious explanation is that the Canadian and U.S. environments are sufficiently alike that Canadian firms do not have to make impossible adjustments to operate south of the border. This is an advantage relative to competitors from other countries that may serve Canadian service firms well as they enter the U.S.

When cases for which estimated foreign share and concentration were added (column 2), comparable results were obtained. Although the main effect of foreign share at entry lost statistical significance at conventional levels (p=.12), the magnitudes of all coefficients, including intercept and scale parameter, were similar across the two sets of estimates. Using the point estimates of the share and share-squared coefficients, the share influence peaked at about 15% and became negative at about 29%.

The reduced significance of foreign share in the second model may indicate that our estimated shares were partially inaccurate or that the initial positive effect of foreign presence
does not hold for the full sample. We prefer to believe the former explanation. Even if the latter reason is true our results continue to be significant, because they indicate that a firm will benefit if it expands before an industry reaches global status.

We also tested the effect of several other likely factors, which we do not include in the reported models owing to sample size. No significance influences were found for entry year; corporate size; whether the entrant manufactured in the U.S. or solely imported from Canada; whether the U.S. entry represented unrelated diversification by the Canadian-based firm; entry by acquisition versus other entry modes; and growth in foreign share after entry.

**CONCLUSION**

We found that most Canadian-based firms that entered the U.S. medical sector between 1968 and 1989 have survived. Of 31 entrants that we identified, 21 continued to operate in mid-1991. We identified two influences on the length of survival. Participation tended to be shorter in highly concentrated industries. Entering a market when foreign firms held no more than a moderate share of the U.S. market often led to longer survival, consistent with our prediction that the likelihood of success is greatest in industries that are undergoing the transition to global status but have not yet become global. Together, these results indicate that the greatest chance of success lies in identifying relatively fragmented national industries that have begun the transition from domestic to global status or are about to do so. Entry should then be neither too early, nor too late. The management challenge is to find a happy medium.

This study could usefully be extended. We have examined firms based in only one country, entering only one industrial sector, in only one international market. Varying any of these factors might lead to different results. German and Japanese firms may face different stresses than Canadian companies when they enter the U.S. Conditions in the telecommunications sector may be systematically different than those in the medical sector. Entrants to France or Australia may come under different pressures than firms entering the U.S. In addition to these factors, it would be useful to examine influences produced by entry timing, market growth, an entrant's strength in its domestic market, and the international scope of an entrant's operations. We believe, though, that the core conclusions are robust.

Overall, our results lead to new questions. Do early entrants to industries that later undergo transition to global status tend to fail because they make errors, such as choosing the wrong locations, wrong labour and sourcing strategies, and wrong product and pricing policies? Do later entrants learn from such mistakes and increase their chance of success, so that the descendents enjoy the trees that grow from seeds planted by the pioneers? Are there effective ways of undertaking tapered early entry strategies that allow a firm to learn about a new market, while avoiding unrecoverable mistakes? We expect that these issues will lead to fruitful research.

Whether based in Canada or any other country, firms that wish to succeed in the 21st century -- which in the title of this paper we facetiously refer to as winning the war of 2012 -- must expand internationally as the industries in which they operate become global in scope. This will require firms to undertake an uncertain and trying learning process. Although global operations may provide many advantages for profitability and survival, such as volume economies in production and access to new capabilities, a firm must learn that the advantages exist and learn how to incorporate them into its operations. Managers must adapt their existing organisations to embrace new knowledge, including new techniques, new products, and new approaches to serving markets. Many firms will fail in this evolutionary process of organisational change, either because they make the wrong choices of new knowledge or because they drastically disrupt the existing organisation. The firms most likely to succeed are those that expand early enough to get ahead of the competitive pack, and then combine existing
capabilities with knowledge acquired through long-term investment in international expansion to become superior competitors.
REFERENCES


Table 1. Entry and exit modes

<table>
<thead>
<tr>
<th>Entry mode</th>
<th>Acquisition (31 cases)</th>
<th>New Business</th>
<th>Joint Venture</th>
<th>Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>13</td>
<td>12</td>
<td>1 *</td>
<td>5 **</td>
</tr>
</tbody>
</table>

| Exit mode  | Acquisition | Disappear (10 cases) | 2 | 8 |

* Later converted to wholly-owned subsidiary of the Canadian partner.
** Most unknown cases are likely new business.

Table 2. Descriptive statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
<th>6.</th>
<th>Mean(s.d.)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign share known (N=19)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Foreign share</td>
<td>1.0</td>
<td>.95</td>
<td>.53</td>
<td>-.52</td>
<td>-.22</td>
<td>-.16</td>
<td>10.3 (10.6)</td>
<td>1-36</td>
</tr>
<tr>
<td>2. Share squared</td>
<td>1.0</td>
<td>.47</td>
<td>-.40</td>
<td>-.24</td>
<td>-.23</td>
<td>213.4 (326.9)</td>
<td>1-1296</td>
<td></td>
</tr>
<tr>
<td>3. Concentration</td>
<td>1.0</td>
<td>-.49</td>
<td>-.35</td>
<td>-.49</td>
<td>30.6 (26.0)</td>
<td>4-87</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Service industry</td>
<td>1.0</td>
<td>.51</td>
<td>.09</td>
<td>.26 (.45)</td>
<td>0-1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Survival length</td>
<td>1.0</td>
<td>.51</td>
<td>7.5 (4.5)</td>
<td>3-20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Survive</td>
<td>1.0</td>
<td>.74 (.45)</td>
<td>0-1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Including estimated foreign share (N=31)

<table>
<thead>
<tr>
<th>Variable</th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
<th>6.</th>
<th>Mean(s.d.)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Foreign share</td>
<td>1.0</td>
<td>.96</td>
<td>.51</td>
<td>-.39</td>
<td>-.29</td>
<td>-.11</td>
<td>9.5 (9.5)</td>
<td>1-36</td>
</tr>
<tr>
<td>2. Share squared</td>
<td>1.0</td>
<td>.47</td>
<td>-.29</td>
<td>-.30</td>
<td>-.15</td>
<td>179.2 (293.3)</td>
<td>1-1296</td>
<td></td>
</tr>
<tr>
<td>3. Concentration</td>
<td>1.0</td>
<td>-.42</td>
<td>-.28</td>
<td>-.35</td>
<td>28.3 (21.9)</td>
<td>4-87</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Service industry</td>
<td>1.0</td>
<td>.19</td>
<td>.16</td>
<td>.19 (.40)</td>
<td>0-1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Survival length</td>
<td>1.0</td>
<td>.25</td>
<td>8.3 (5.4)</td>
<td>3-24</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Survive</td>
<td>1.0</td>
<td>.68 (.48)</td>
<td>0-1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Accelerated failure-time estimates of effects on survival of Canadian medical sector firms operating in the U.S., 1970-1990

<table>
<thead>
<tr>
<th>Variable</th>
<th>.Foreign share known</th>
<th>.Including estimated share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign share at entry/10</td>
<td>1.05 (.65) *</td>
<td>.82 (.70)</td>
</tr>
<tr>
<td>Foreign share squared/100</td>
<td>-.32 (.17) **</td>
<td>-.28 (.19) *</td>
</tr>
<tr>
<td>Concentration at entry/10</td>
<td>-.14 (.09) *</td>
<td>-.14 (.08) **</td>
</tr>
<tr>
<td>Service industry</td>
<td>.46 (.74)</td>
<td>.48 (.66)</td>
</tr>
<tr>
<td>Intercept</td>
<td>2.50 (.75) ***</td>
<td>2.63 (.52) ***</td>
</tr>
<tr>
<td>Scale</td>
<td>.33 (.13)</td>
<td>.43 (.11)</td>
</tr>
<tr>
<td>( \chi^2 ) (d.f.)</td>
<td>8.2 (4) *</td>
<td>7.8 (4) *</td>
</tr>
<tr>
<td>Base loglikelihood explained</td>
<td>.32</td>
<td>.17</td>
</tr>
<tr>
<td>N (exited)</td>
<td>19.5 (5)</td>
<td>31.10</td>
</tr>
</tbody>
</table>

\(^a\) Positive coefficients indicate longer survival, based on a loglogistic baseline distribution.

\(^{**}\) p<.01, \(^{**}\) p<.05, \(^*\) p<.10 (one-tailed tests; standard errors in parentheses)