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Complete List of Authors:	Sasatani, Daisuke; University of Washington, School of Environmental and Forest Sciences Eastin, Ivan; University of Washington, School of Environmental and Forest Sciences
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Firms in North America**

Full Name: Daisuke Sasatani
Affiliation: Research Associate, Center for International Trade in Forest Products, School of
Environmental and Forest Sciences, University of Washington
Postal: School of Environmental and Forest Sciences Box 352100, Seattle, WA 98195, USA
Telephone: +1-(206)-616-3681
Email: sasatani@uw.edu

Full Name: Ivan L. Eastin
Affiliation: Professor and Director, Center for International Trade in Forest Products, School of
Environmental and Forest Sciences, University of Washington
Postal: School of Environmental and Forest Sciences Box 352100, Seattle, WA 98195, USA
Telephone: +1-(206)-543-1918
Email: eastin@uw.edu

Abstract

An Augmented Internationalization Process (AIP) model is developed to explain important factors influencing decisions of small and medium sized softwood sawmill firms in the US and Canada. The decision to participate in exporting (i.e., export orientation) and the decision to intensify exporting activities (i.e., export involvement) are analyzed using ordinal probit hurdle regression model. Production capacity, geographical location, and the degree of differentiation strategies are factors playing important roles in determining the level of internationalization of the firm (i.e., export orientation + export involvement). Larger US firms are more likely to participate in exporting activities, while Canadian firms of all sizes are exporters. Also, firms in the US South are unlikely to participate in international business activities unless they adopt a product differentiation strategy and even then they are more likely to use intermediary firms rather than undertake export activities directly. Firms adopting a differentiation strategy rather than a cost-leadership strategy are more likely to have a higher degree of internationalization. A major conclusion of the analysis is that developing a product differentiation strategy is a key to participation in international markets. (182 words)

Key words: Softwood Sawmills, SME, Internationalization Process, Export, Hurdle Model

Word Counts: 7,012 words

35 **Introduction**

36 North America (i.e., US and Canada) is a forest resource rich region. Thus, it is expected that
37 firms in this region would participate in the global economy and export forest products from North
38 America in order to help meet the demand of forest resource poor countries (Hansen and Juslin
39 2011). It is well known that Canadian firms have historically participated in export markets more
40 than their American counterparts (Rich 1981). Generally, sawmilling companies in the US have a
41 reputation of bouncing in and out of the export market to get rid of excess production (Rich 1981). In the US,
42 about 80 percent of lumber from softwood sawmills ends up in building construction projects
43 (Spelter et al. 2009), and thus the domestic demand for softwood lumber depends on the
44 resilience of the housing sector. Due to the subprime mortgage crisis, housing starts in the US plummeted
45 from 2.07 million units in 2005 to just 550,000 units in 2009 (US Census Bureau 2015). During the US
46 housing crisis, US lumber consumption declined sharply from 64.3 billion board feet (bbf) in 2005 to 31.3
47 bbf in 2009 (WWPA 2012). In 2010, US domestic lumber demand remained historically low and the US
48 dollar was relatively weak against other major currencies. However, some small and medium-sized
49 enterprises (SMEs)¹ in North America still hesitated to export their products while other sawmills
50 actively cultivated opportunities in offshore markets. This difference is likely influenced by the

¹ Every country has its own definition of what is considered a small and medium-sized enterprise. In this study, we adopt the definition of the US Small Business Administration Office of Advocacy: SMEs include all enterprises with fewer than 500 employees (US ITC 2010).

managerial capability of firms. Since SMEs play a major role in economic development (US ITC 2010), the promotion of exports by SMEs has been an area of critical interest for policymakers (Diamantopoulos et al. 1993). Expanding exports by SMEs in the softwood lumber industry in North America can increase the total demand for forest products, create jobs especially in forest-dependent rural areas, improve forest health, and maintain industry diversification (Lippke et al. 2000). In order to promote exports of softwood lumber, it is critical to understand the internationalization, the process of increasing involvement of enterprises in international markets, employed by small and medium-sized softwood sawmill firms.

Within the forest products sector, empirical studies abound concerning export participation and export success. Many studies consistently report that international market knowledge, or at least the perception of whether a firm has sufficient knowledge about international markets, is one of the most important obstacles to whether a firm enters international markets (e.g., Ifju and Bush 1993, Dickerson and Stevens 1998, Gottko and McMahon 1989, Hammet and DeForest 1993, Hammett et al. 2009). However, despite the broad empirical accumulation of evidence, no comprehensive study has quantitatively analyzed the internationalization pattern of forest product firms. It is also not known how other factors, such as business strategy, influence export activities after controlling for the location of firms.

Widespread empirical research across exporting industries has been well documented in the

69 international business literature (Dichtl et al. 1984). Unlike large firms that tend to structurally
70 determine foreign entry strategies (Reid 1981), one of the most important determinants of an SME's
71 export strategy is the perception of the decision maker of the firm (Miesenbock 1988). Managers of
72 SMEs often anticipate a risk of internationalization and a lack of market knowledge prior to entering
73 an export market (Leonidou 2004). Managers of SMEs which already export show a higher export
74 orientation, defined as being willing to mobilize the necessary resources to initiate the firm's active
75 involvement in exporting (Abdel-Malek 1974). Although some SMEs start by targeting international
76 markets, successfully making profits from these markets requires a distinctive set of resources
77 (Wernerfelt 1984) and capabilities (Barney 1986) because SMEs typically face both external and
78 internal barriers to export (Leonidou and Kastikias 1996). In order to overcome these barriers, firms
79 often gradually intensify their activities in international markets as they acquire experiential
80 knowledge in the market (Johanson and Vahlne 1977). This well-established framework,
81 documented in the international business literature can be useful in analyzing the internationalization
82 patterns of forest products firms.

83 Until the 1990s, international trade was viewed as a major global business topic in the forest
84 products field. And, as globalization² has accelerated, the international business of the forest

² In this article, internationalization refers to the increasing importance of international trade; globalization refers to global economic integration. Hence, internationalization is viewed a subset of globalization. And exporting is considered a subset of internationalization.

products industry has changed drastically. Globally, countries compete to attract more firms by capitalizing on their unique set of competitive advantages (Sasatani 2009, Mehrotra and Kant 2010). In order to exploit opportunities, firms must consider which foreign market to enter, when to enter, on what scale, and with what kind of entry mode. Since the 1990s, some companies have utilized international trade as well as foreign direct investment (FDI) to target global markets (Uusivuori and Laaksonen-Craig 2001, Nagubadi and Zhang 2011). Some researchers investigated the global supply chain and international operations. Large scale sawmills, which were established next to ports in Japan to produce lumber from imported logs, became much more efficient than the sawmills processing domestic logs supplied by an inferior logistics system (Eastin and Larsen 2007, Eastin and Sasatani 2014). Many labor intensive manufacturers, such as furniture and woodworking factories, moved to China and then shifted to Vietnam in order to exploit lower production costs after the economic liberalization that began at the end of the 20th century (Barney 2005, Roe et al. 2014, Roe 2015). These examples are far from a complete list³, but researchers typically view these globalization phenomenon through an institution-based lens (e.g., North 1990, Peng et al. 2008); focusing on the business environment (e.g., exchange rate, price differences, resource availability, logistic, etc) and institutional factors (e.g., regulations, political environment, society, culture, tariffs/subsidies, etc) surrounding international business activities. However, a corporate level

³ Zhang et al. (2014) thoroughly reviews internationalization of the forest products industry.

analysis of international business, especially the influence of strategic management on internationalization, is a less explored area in the forest products field (Zhang et al. 2014). Even though there is a tremendous amount of literature about international business topics in the forest products field, the literature pays little attention to the relationship between a firm's idiosyncrasy and international business activity. In order to expand and refocus the literature, we will quantitatively explore the pattern of internationalization of small and medium-sized softwood sawmills in North America with respect to the heterogeneity of strategic management within each firm. The next section develops the conceptual framework and constructs hypotheses, followed by the development of methodology, models, and results. The final section provides some discussion and conclusions.

Literature Review

Internationalization Theory and Conceptual Framework Development

Under the assumption of “perfect information,” normative economics explains how firms should eclectically choose the most rational way to conduct international business (e.g., Dunning 1980). However, SMEs often do not enter international markets as economic theories predict (Miesenbock 1988). Doing business in foreign countries results in higher costs arising from the unfamiliarity of the business practices, regulatory environment, cultural, political, and economic differences (Hymer 1976). SME managers perceive these higher costs as barriers to entering foreign

markets (Leonidou and Kastikias 1996). This concept is known as the liability of foreignness (Zaheer 1995).

In practice, firms usually begin by targeting markets that are similar to their domestic market. They start exporting through external intermediaries and only replace these agents with their own sales teams as their export sales grow and they become more familiar with exporting (Johanson and Wiedersheim-Paul 1975). Based on these observations, Johanson and Vahlne (1977) proposed the Uppsala internationalization process (IP) model using the knowledge-based theory of the growth of the firm (Penrose 1959), the behavioral theory of the firm (Cyert and March 1963), and the foreign investment decision process (Aharoni 1966). In the IP model, once a firm enters a foreign country, it gains market knowledge through its business operation. As this knowledge accumulates, the firm adjusts its degree of foreign business involvement in order to strengthen its position in the foreign market. Firms usually begin exporting to culturally similar and/or geographically close countries before gradually moving to culturally more distinct and/or geographically more distant countries. Since firms often experientially learn before engaging in a higher level of international business engagement, a step-by-step pattern of foreign expansion is often observed. Similarly, many scholars have generalized the behavior of an individual firm's process of internationalization (e.g., Bilkey and Tesar 1977). The IP model predicts how firms increase their level of international business involvement; although it cannot predict which firms are more likely or more prepared to expand into

international markets. Hence, another branch of international business theory is needed to explain the complete pattern of SME's process of internationalization.

New global trends, such as advances in process, logistics and communication technology, can allow small firms to gain an inherent advantage in international business (Knight and Cavusgil 2004). McDougall et al. (1994) have empirically observed that some firms enter international markets from their inception. These firms, referred to as "international new ventures" (McDougall et al. 1994), "global-start-ups" (Oviatt and McDougall 1994), and "born global firms" (Knight and Cavusgil 2004), are discussed within the context of international entrepreneurship (IE). IE is defined as the process by which the firm discovers and exploits opportunities in the international marketplace and firms with higher IE are more likely to be involved in international business (Zahra and Schulte 1994). Export-orientation (Abdel-Malek 1974) is a subset of IE and is thought of as a priority to guide the process of export decision making of SMEs. Thus, we can assume that exporters and non-exporters display different export-orientation traits.

Combining the IP model and the IE literature leads to an augmented internationalization process (AIP) model. The whole internationalization process of SMEs starts with the decision of whether the firm should expand their efforts beyond the domestic market and into international markets. This decision is influenced by their "export orientation" trait. Integral to this decision is the determination of what level of resources the firm is willing to commit to developing the export

market, which is directly related to the firm's degree of "export involvement" trait. Some scholars argue that the step-by-step IP model is very deterministic (e.g., Petersen et al. 2010), but the AIP model is not. The AIP model posits that the observed level of internationalization activity by a firm is determined by the two unobservable traits of the firm; export orientation and export involvement. The AIP model is applicable to many different industries. Figure 1 depicts the AIP model for the North American softwood sawmill industry. The model describes four different types of softwood sawmill firms based on their level of international business operations: 0) the firm has never exported and focuses solely on the domestic market ("domestic focus"), 1) the firm engages in indirect exports ("indirect exporter"), 2) the firm directly exports but only to a neighboring country ("exports to only Canada/US"), and 3) the firm exports directly to markets located outside North America ("exports offshore"). The main assumption of this study is that certain factors systematically influence the export orientation and export involvement traits of small and medium-sized softwood sawmills.

[Insert Figure 1 Conceptual framework of Augmented Internationalization Process (AIP) model of SMEs for North American softwood sawmill business]

Firm size

In regard to export participation, most researchers agree that across different industries, larger SMEs are more likely to engage in exporting than are smaller SMEs (Leonidou and Kastikias

1996). The forest product marketing literature also reports that there is a positive relationship between firm size and export participation (e.g., Ifju and Bush 1993, Naka et al. 2009). Many studies consistently report that whether a firm has sufficient knowledge about international markets, is one of the most important factors to whether a firm enters international markets. Non-exporting companies that express no interest in becoming exporters perceive themselves as being too small to export and are focused on selling into the domestic market (Ifju and Bush 1993). It is likely that many small sawmills view international business as a risky investment for allocating their limited resources. Thus, we hypothesize that larger firms will have a higher export orientation (i.e., be more likely to export) than will smaller firms in the softwood sawmill industry.

Conversely, empirical studies across various industries have reported that firm size and export involvement have a mixed relationship across industries among SMEs (Miesenbock 1988). Though, export involvement is a less explored area in the forest products literature, but is often mentioned as a factor in export success⁴. In the forest products industry, there is also little agreement on the relationship between firm size and export success (Eastin et al. 2004). For instance, Ringe et al. (1987) found that firm size was not a significant factor in export success among Kentucky hardwood lumber producers. Ilinitich et al. (1994) also found that firm size was not directly

⁴ The fundamental importance of export performance to international marketing has led to a substantial body of study. Yet, export success has been measured by a myriad of indicators including export sales, export growth, export profitability, export intensity, and perceived success (Zou et al. 1998).

correlated with the export success of forest products firms in the Pacific Northwest. In fact, the increased bureaucracy and conservative management practices of larger firms may adversely impact their export success. Though export involvement may not perfectly correlate with export success, we hypothesize that firm size is not directly related to the export involvement of a firm.

H1a: Larger firms are more likely to export than smaller firms.

H1b: Firm size does not relate to levels of export involvement.

Product differentiation strategy

Determining the scope of the firm (i.e., diversification) is one of the fundamental decisions for firms, although diversification is not a guaranteed route to economic success (Montgomery 1994). There are two different types of scope that a firm considers: product diversification and geographic diversification (Peng and Delios 2006). These two types of diversification are integrated into the firm's business strategy. In order to investigate geographical diversification (i.e., exporting activity) of a firm, it is critical to link it to product diversification of the firm.

Markets for commodity products and value-added products are very different. According to Porter (1980), firms need to change generic strategies (i.e., cost-leadership and differentiation) depending on which markets they intend to target. Commodity wood products, such as dimension lumber, offer little or no perceived differences between competitive offerings outside of price (Kozak et al. 2004). On the other hand, value-added products, such as wooden furniture, flooring,

208 and millwork, are usually differentiated by consumers in the marketplace (DeLong et al. 2007).
209 Hence, a firm that creates fewer products is more dependent on its customers than a firm that has
210 multiple products that are being sold into a variety of markets (Pfeffer and Salancik 1978). If a firm
211 offers a variety of products, it widens the scope of markets geographically, including international
212 markets. Hence, we hypothesize that a firm with a differentiation strategy has a higher export
213 orientation (i.e., is more likely to export).

214 The relationship between the degree of export involvement and product diversification is
215 rooted in the field of transaction cost economics (e.g., Williamson 1979). Keeping an in-house
216 international sales force is expensive for manufacturers. If a firm sells commodity products, they
217 may be better off outsourcing their sales function. On the other hand, if a firm sells value-added
218 products, their monitoring and enforcement costs, such as specialized sales force training and
219 post-sales service, rise (Peng and Ilinitich 1998). Consequently, diversified firms are better off
220 internalizing the sales function rather than relying on intermediaries (Peng et al. 2006). This rule can
221 also be applied to the forest products industry; hence, we predict that firms selling commodity
222 lumber are more likely to use intermediaries, while firms selling value-added/diversified forest
223 products are more likely to export directly. A firm with a product differentiation strategy is more
224 likely to display a higher degree of export involvement.

225 H2a: A firm that applies a differentiation strategy is more likely to export than a firm that has

not applied a differentiation strategy.

H2b: A firm that applies a differentiation strategy is more likely to commit to a higher degree of exporting than a firm that has not applied a differentiation strategy.

Methodology

Data Collection

In this study, we used a mail survey to collect primary data. In order to control non-coverage, sampling, non-response and measurement errors (Dillman 1991), we designed the data collection method carefully with a limited survey budget. The unit of analysis in this study is the firm, not individual sawmills. The population examined consisted of small and medium sized softwood sawmill firms⁵ in North America. Though portable operations and very small sawmills were not included, the “Profile of Softwood Sawmills in the United States and Canada” (Spelter et al. 2009) lists the vast majority of softwood sawmills in North America. We cross-referenced this information with annual industry data from the Big Book (Random Lengths 2010) and the opinions of industry experts. Based on this, 406 softwood sawmill SMEs were identified in the US and Canada.

In order to gain a broader understanding of the issues confronting sawmill managers and their decisions regarding the export of softwood lumber, preliminary non-structured interviews were conducted with sawmill managers, lumber traders, and market consultants. Based on the information

⁵ Small and medium-sized sawmill firms do not include micro sawmills and portable operations.

collected, a draft questionnaire was developed. In order to reduce the source of measurement errors, eleven industry experts pre-tested the survey instrument. They provided comments and suggestions on content, terminology, readability and clarity. The final questionnaire incorporated all of the comments and suggestions to make the survey instrument valid, reliable and unambiguous. A cover letter and questionnaire were mailed to the president, general or sales managers of softwood sawmill firms in two waves. The survey and cover letter were translated into French by FP Innovations in order to administer the survey in Quebec and in New Brunswick. The French version of the survey was then translated back to English to check the consistency of the questions. The first wave of surveys was mailed in June 2011 while the second wave of surveys was mailed in October 2011.

Variables

As the dependent variable for this study, four different levels of ordinal-level internationalization commitment of a firm were recorded for each respondent as shown previously in Figure 1; 0) domestic focus, 1) indirect exporter, 2) direct exporter to only Canada/US, and 3) direct exporter offshore. In this study, direct exporting occurs when the sawmill firm is directly involved in the selling and marketing of wood products to international customers even though they may use a forwarder to deliver their products. In contrast, indirect exporting means the sawmill firm is not directly involved in the export process, but works with an intermediary (e.g., traders and wholesalers). Thus, indirect exporters have a chance to learn the market trends and characteristics of

international customers. There are many situations where the lumber from a particular firm may end up in export markets, but the firm is totally unaware of it. Since this situation is not an international action, it is not considered as indirect exporting in this study.

The first independent variable included in the model is firm size. The eight-hour production capacity of all sawmills owned by each firm (in mbf) was used as a proxy for firm size. Since the production capacity of a firm is a relatively long-term decision, and less affected by short-term economic shocks, it is a better measure of firm size than other variables such as production volume and number of employees (Sasatani and Zhang 2015). The firm size indicator generally displays a right-skewed distribution since the size of the firm usually increases proportionally. Thus, a natural logarithm was used to transform the eight-hour production capacity.

The second independent variable used in the model was the degree of a firm's product differentiation. Because correctly classifying a firm's degree of product differentiation can be challenging, two measurement tools were applied in this study. First, we approximate the degree of product differentiation of each firm by counting the number of value-added products the firm manufactures. The type of value-added products included in the survey included planed lumber, kiln-dried lumber, certified lumber, end painting, decking/shop lumber, railroad ties, lam-stock, pallet stock, preservative treating, crossarms, finger jointing, and machine stress rating (MSR). These products are based on the product list of Big Book (Random Length 2012), but we excluded

obvious endogeneous items, such as export clears, in order to avoid a simultaneity problem during model estimation. Since the number of value-added products can only partially embody the concept of a firm’s product differentiation strategy, a subjective measurement was also used to estimate the degree of differentiation of each firm. Each firm was assumed to have a different level of differentiation orientation that determines the firm’s differentiation strategy. When a firm pursues a high level of product differentiation, they tend to adopt a business model focused on pursuing a differentiation strategy rather than a cost-leadership strategy. Based on the literature review and the objectives of this research, a differentiation orientation was assessed using a four-item scale (Table 1). Each item was measured using a five-point Likert-like scale. Confirmatory factor analysis was conducted on the polychoric correlation matrix of each pair of items to determine whether measures of the construct were consistent using the “sem⁶” package (Fox et al. 2014) of R (R Core Team 2015). Finally, the factor score of the differentiation orientation was obtained.

[Insert Table 1. Estimated factor loadings for differentiation strategy of firms]

Other independent variables were included as control variables. The geographic location dummy variable was based on whether the headquarters of the firm was located in Canada or the US. Another dummy variable was created if a firm was located in the Southern US.⁷ If the firm owned

⁶ “sem” package is for fitting general linear Structural Equation Models with observed and latent variables.

⁷ In this study, we divided samples into only three different geographic locations because of the limitation

forest land they were considered to be vertically integrated, so vertical integration was another control variable. The survey also asked how long each firm had been in business which served as a proxy for the firm's experience. Finally, the performance of each firm was measured. To make quantification as easy as possible and to keep a high response rate (Nybakk and Hansen 2008), respondents were asked to rate their performance from 2006 to 2010 relative to their competitors using a five-point Likert-like scale.

Model Specification

The AIP model developed for this study consists of hurdle regressions that combine a left-truncated count component with a right-censored hurdle component (Mullahy 1986). The first stage, or hurdle, is the decision whether a firm decides to focus solely on the domestic market or not (i.e., the export orientation). The second stage is the degree of export involvement. In this study, a binomial probit regression was utilized as the first hurdle and an ordered probit regression was used as the second model. Thus, the sequential model employed in this study is called a hurdle ordered probit regression.

A latent trait of the firm variable z_i^* that represents the export-orientation trait and a latent trait variable y_i^* that represents the export involvement trait of firm i are defined as:

of the sample size. Industry consolidation is very severe in some parts, such as Western Canada, and thus it was not statistically possible to segment Canada into Western and Eastern regions.

311 $z_i^* = x_{1i}\beta_1 + \delta_i, \quad \delta_i \sim \mathcal{N}(0,1), \quad \forall i = 1, \dots, N \quad \text{and}$

312 $y_i^* = x_{2i}\beta_2 + \varepsilon_i, \quad \varepsilon_i \sim \mathcal{N}(0,1), \quad \forall i = 1, \dots, N \quad (1)$

313 where x_{1i} and x_{2i} are vectors of the characteristics of firm i ; β_1 and β_2 are the vectors of the

314 regression coefficient estimates assuming that the latent value is explained by the linear combination

315 of a firm's characteristics; and δ_i and ε_i are unsystematic disturbances which are assumed to be

316 normally distributed.

317 There are four ordered levels for the internationalization process of a firm ranging from 0 to

318 3, as shown in Figure 1. If firm i is located in the US, we write the probability of y_i as:

319 $\Pr(y_i = k|x_{1i}) = \int_{-\infty}^{z_i^*} f_{\mathcal{N}}(0,1), \quad \text{where } k = 0 \quad \text{and,}$

320 $\Pr(y_i = k|x_{1i}, x_{2i}) = \int_{z_i^*}^{\infty} f_{\mathcal{N}}(0,1) \int_{\tau_{j-1}}^{\tau_j} f_{\mathcal{N}}(y_i^*, 1), \quad \forall j = 1,2,3, \quad \text{where } k = 1,2,3, \quad (2)$

321 where k is the level of internationalization of the firm from 0 to 3n and $f_{\mathcal{N}}$ is the normal cumulative

322 distribution function. If y_i falls into category k , then all other categories $j \neq k$ are irrelevant. When $k=0$,

323 only the export-orientation matters for the probability function. On the other hand, given a firm

324 crossing the hurdle (i.e., $k=1,2,3$), the probability that firm i adopts level k of the internationalization

325 process is equal to the area under the cumulative normal distribution curve whose mean is the mean

326 of the latent factor of export involvement and whose standard deviation is set to 1. The τ s in eq(2)

327 are the cut points of the latent export involvement which range from τ_{j-1} to τ_j , where τ_0 is $-\infty$,

328 τ_1 is set to 0, and τ_3 is $+\infty$. Consequently, we estimate only τ_2 for the model.

As discussed later, no Canadian firm respondent focused solely on the domestic market, so all of the Canadian firms automatically crossed the first hurdle. Thus, if firm i was located in Canada, we can rewrite the probability function of y_i as:

$$\Pr(y_i = k | x_{2i}) = \int_{\tau_{j-1}}^{\tau_j} f_N(y_i^*, 1), \quad \forall j = 1, 2, 3, \text{ where } k = 1, 2, 3. \quad (3)$$

In order to estimate the coefficient parameters β_1, β_2 and τ_2 for the model, the log of the likelihood function was maximized by utilizing the “optim”⁸ function in R (R Core Team 2015). The most parsimonious model was selected using the Akaike Information Criteria (AIC) (Buckland et al. 1997).

Interpretation of the estimated coefficient is challenging since the model is complex and non-linear. Thus, we use a simulation-based approach (King et al. 2000), wherein these coefficient estimates are transformed into counterfactual probabilities to help interpret the relative magnitude of each type of effect on a hypothetical firm. In this study, 10,000 draws were taken from the multivariate-normal distribution with means at the point estimates from the model and a variance matrix as the estimated variance-covariance matrix for the coefficients estimated. The 10,000 simulated coefficients were placed into vectors and simulated to predict the counterfactual probability for a hypothetical softwood sawmill firm which has a set of given independent variables along with some likely scenarios. We graphically report some of the predicted probabilities by

⁸ “optim” function performs minimization based on a quasi-Newton method.

utilizing the “tile” function (Adolph 2012) of R (R Core Team 2015) which helps provide a meaningful interpretation of complex nonlinear models of business strategies (Zelner 2009).

Results

Of the total 96 responses received, 89 valid responses were used for the analysis (a 21.9% response rate). Table 2 shows a summary of the dependent variables and the location of firms. Among the survey respondents, 65 were from the US (a 23.3% response rate) and 24 were from Canada (a 20.3% response rate). Furthermore, the response rate for the French version of the survey was 24.5%.

The results show that all of the Canadian firms engage in some degree of international business; 54.2% reported that they export directly to the US and 41.7% reported that they export directly to other parts of the world. On the other hand, 40.0% of the US firms sold their products only in the US, 24.6% of US firms indirectly exported through intermediaries, while 35.4% directly exported their products. In the US, the Pacific Northwest (PNW), the South and the Northeast & Upper Midwest (NE) are the three major softwood lumber producing regions⁹. The survey results indicate that 27.3% of NE firms, 40.7% of PNW firms, and 52.9% of southern firms sell only into

⁹ In this study, the Pacific Northwest (PNW) region includes ID, MT, CA, OR and WA. The south region includes AL, AR, FL, GA, KT, LA, MS, NC, OK, SC, TN, TX and VA. The Northeast and Upper Midwest (NE) region includes MN, WI, MI, OH, PA, NY, MA, VT, NH and ME.

the domestic US market, while 44.4% of PNW firms, 40.9% of NE firms and 17.6% of southern firms directly exported lumber.

[Insert Table 2. The level of internationalization commitment and location of firms]

Before estimating the hurdle model parameters, four procedures were conducted. First, to check for non-response bias, we conducted two evaluations. We first applied an extrapolation method assuming that late respondents are similar to non-respondents (Armstrong and Overton 1977). We compared the key variables of first 30 respondents against the last 30 respondents. Then, in order to check the representativeness of the sample, we compared the production capacity and location of the respondents and non-respondents. In both cases, various parametric and non-parametric statistical tests did not reveal any systematic differences, suggesting that there was little non-response bias. Second, missing values were imputed. Approximately 0.3% of the values for the independent variables were missing and a multiple imputation method was applied to reduce bias in both the coefficients and standard errors versus a simple list-wise deletion (King et al. 2001). Third, the factor score of the differentiation orientation was estimated for each respondent based on the results of a confirmatory factor analysis. Cronbach's alpha for the four items in Table 1 was 0.71, which suggests that the internal consistency of the data was acceptable (Gadermann et al. 2012). The model's Chi-square value was 4.48 (d.f.=2; $p=0.106$), the CFI was 0.944 and the RMSEA was 0.119.

According to Hu and Bentler (1999), these goodness-of-fit indices suggest that the model we use to estimate the differentiation strategy of firms provides a good fit to the data. The factor loadings of each individual item were statistically significant at the 1% level and factor scores were calculated for each respondent. The descriptive statistics and the correlation between variables are summarized in Table 3. Pearson's correlation is applied between the two continuous variables and Spearman's rank correlation is applied for the ordinal variables.

[Insert Table 3. Descriptive statistics and correlation between dependent and independent variables]

The estimation results for the hurdle ordered probit regressions are presented in Table 4. The full model that included all possible variables was first estimated. A backward stepwise procedure was used to determine which firm characteristics and interaction variables should be retained in the most parsimonious model. For the first hurdle of the model, log-capacity had a positive effect and was statistically significant at the 1% level, which confirms H1a for US firms. Also, the interaction composed of the south location dummy variable and the differentiation orientation variable had a positive effect and was statistically significant at the 1% level; and partially supports H2a among only the southern firms. Once a firm crosses the initial hurdle, they define their level of export involvement; a decision that is represented in the ordered regression. The south location dummy variable, differentiation orientation trait variable and product diversification variable (as measured by the number of value-added products they produced) remained in the model. The south region

dummy has a negative sign and is statistically significant at the 10% level ($p=0.084$). This result suggests that if a firm is located in the southern US, it is less likely to engage in a higher level of international business activity. Product diversity had a positive effect and was statistically significant at the 1% level ($p=0.000$); suggesting that the higher the number of value-added products a firm manufactures, the more likely it is to engage in a higher level of international business activity. This result substantiates H2b. In contrast, firm size did not remain in the ordered regression (i.e., firm size had no statistical effect on the level of export involvement), which supports H1b. Furthermore, years in business and forest land ownership were not statistically significant and were dropped from all parts of the model. This suggests that a firm's experience and their vertical integration do not influence their level of internationalization.

[Insert Table 4. Model estimations of the ordinal hurdle regression]

The effects of the independent variables are complex and non-linear; hence, the interpretation of these effects must rely on counterfactual simulations based on the final model. In the first set of simulations, we considered how capacity change (i.e., firm size) and firm location influence the probability of the firm engaging in international business activities. We assumed three hypothetical firms located in the southern US, the northern US, and Canada that change their eight-hour capacity from 5 to 1,000 mbf. Other continuous independent variables of the hypothetical firm were set to sample mean values, and the discrete independent variables were set to sample

median values. The counterfactual probabilities were estimated for each case of the hypothetical firm: 0) domestic focus, 1) indirect exporters, 2) direct exports to only Canada/US, and 3) direct exports offshore. Figure 2 shows the results for only cases 0) and 3) in order to reduce the complexity of the figures. These results show that for a hypothetical firm in the southern or northern US regions, as their production capacity increases, the likelihood that the firm only sells into the domestic market declines. For example, if a firm in the southern US produces about 20 mbf per eight-hour shift, the probability that they will only sell their products domestically is between 0.45 and 0.65, and the probability that they target international markets is around 0.1. In contrast, a hypothetical firm located in the northern US would be more likely to commit to a higher level of international business activities—roughly 0.2. Since production capacity does not influence the ordered regression, the probability that a hypothetical Canadian firm directly exports is about 0.4 and does not vary by production capacity.

[Insert Figure 2. Counterfactual probabilities]

The next scenario focuses on the observed product diversification of the firm. Similar to the previous scenario, three hypothetical sawmill firms located in the southern US, the northern US and Canada were created and the number of value-added products of the hypothetical firm varied from 0 to 6. All other continuous independent variables were set to sample mean values, and the discrete independent variables were set to sample median values. Figure 3 only shows the simulated

probability of 0) domestic focus and 3) export offshore for clarity. Product diversification matters only for the ordered probit regression part of the model; thus, the probability that a hypothetical firm focuses on the domestic market was not affected by the number of value-added products manufactured in the southern US and northern US. On the other hand, the likelihood that a firm will commit to a higher level of exporting activities increases as the firm increases its number of value-added products. A similar trend was observed in Canada, where as the number of value-added products increases, the likelihood that a firm will commit to a higher level of international business activity also increases. The acceleration for firms in Canada is the fastest, followed by the northern US and the southern US.

[Insert Figure 3. Counterfactual probabilities]

Discussion and conclusion

We investigated the factors that influence the level of internationalization of softwood sawmill SMEs in North America based on our AIP model. Results show that all of the Canadian SMEs were involved in export activities. Among US SMEs, larger firms were more likely to be involved in export activities. Also, product differentiation is key in determining the level of internationalization of softwood sawmill SMEs.

The results of this study have broad policy and business implications. First, the geographic location of the firm influences how a firm commits to international business. All of the Canadian

450 respondents reported that they participated to some degree in exporting. Since about 90% of the
451 Canadian population lives within 160 km of the Canada-US border (CIA 2013), firms in Canada
452 naturally target the larger US market because of their inherent geographic advantage, the limited
453 size of their domestic market, and the large size of their domestic forest resource. This result
454 reinforces the observation that Canadian sawmills are “born-global” (Knight and Cavusgil 2004), or
455 at least Canadian sawmill firms that did not export did not survive by 2010. In addition, because the
456 softwood lumber agreement limits their access to the US market, Canadian firms have been
457 increasingly forced to look to offshore international markets. In contrast, many US firms are less
458 interested in exporting, even into neighboring countries. As the survey results show, some US firms
459 located in the north export to Canada, perhaps because the Canadian dollar was at a historical high
460 compared to the US dollar at the time of the study, and because of the strength of the Canadian
461 housing market in 2010. Although Canadian and the US firms have different attitudes toward
462 entering international markets, the geographic location of the firm does not significantly influence
463 the degree of export involvement among exporters (i.e., indirect export vs direct export). Within the
464 US, the geographic location of the sawmill affects the level of international business activity. Firms
465 located in the south have a significantly lower degree of export involvement relative to firms in the
466 north. A vast majority of southern sawmills relies on a dealer system to procure smaller diameter
467 southern yellow pine that they manufacture into commodity-grade dimension lumber. Selling this

commodity grade lumber into international markets is difficult for smaller firms since price competition is very high. Unless they differentiate their products (e.g., pressure treated lumber, MSR lumber, clears, etc), it is difficult to obtain a sufficient margin to justify the higher expenses associated with exporting commodity softwood products.

Second, the survey results indicate that product differentiation is one of the most important factors in influencing the degree of internationalization of small and medium-sized softwood sawmills. A firm can choose to develop a competitive advantage, either by reducing costs or by differentiating its products to command a higher price (Porter 1980). In pursuing a differentiation strategy, the firm looks to augment its basic product (e.g., commodity lumber) with some combination of product attributes valued by the target market (e.g., applying a preservative treatment, kiln drying the lumber, cutting to metric sizes, improving the lumber quality through a proprietary grade, etc.). Many customers in price-sensitive offshore markets (e.g., Caribbean island nations and the Chinese construction sector) are happy to purchase low priced commodity lumber, although the profit margin that a sawmill obtains from selling this type of undifferentiated commodity product will be very low because of intense global competition. On the other hand, niche export markets can generate a higher profit margin, especially where the size of the market segment may be too small for larger sawmills to pursue profitably. Other offshore markets may require that products conform to a local standard (e.g., the Japan Agricultural Standards for structural lumber in

486 Japan) that differs substantially from North American standards. Thus, firms that are willing to
487 differentiate their products can enter international markets easier than firms that are focused on the
488 production of low-cost standardized commodities, particularly since it is difficult for SMEs to
489 compete on price against large sawmills that enjoy substantial economies of scale. The results of this
490 study imply that SMEs can compete successfully in niche markets if they adopt a well-designed
491 differentiation strategy.

492 Third, the survey results suggest that larger US SMEs are more likely to export than are
493 smaller US firms. However, after a firm has entered an export market, firm size does not influence
494 their decision to pursue a direct or indirect export strategy. In general, firms selling complex,
495 differentiated and diversified products, are more likely to export directly rather than utilizing
496 intermediaries, perhaps because they can better explain their products and directly negotiate terms
497 and conditions with customers (Peng and Ilinitich 1998). Conversely, firms selling commodities are
498 more likely to use intermediaries (e.g., traders or wholesalers) since hiring in-house sales specialists
499 may cost more than outsourcing the sales function (Peng and Ilinitich 1998). As a firm grows, it may
500 be less willing to focus on small niche markets, preferring instead to target products with higher
501 commodity content to take advantage of their economies of scale, which may explain why larger
502 SMEs in our study tended to rely on intermediaries to facilitate exports.

Currently, there are two remarkable trends occurring within the North American sawmill industry: market concentration and Canadian firms' acquisitions of US sawmills. With regard to market concentration, larger firms have become even larger while many small sawmills are going out of business because of the economies of scale and tight competition (Sasatani and Zhang 2015). The literature generally suggest that a firm's profitability is not correlated with exports (Schmalensee 1989), and our results support this observation. Yet, our results imply that small and medium sized sawmills would likely benefit by targeting international niche markets to survive. This study supports the idea that implementing a product differentiation strategy for SMEs is important to increase international business participation and involvement. Another important trend in North America is Canadian firms' acquisitions of US sawmills. Several sawmills, especially in the US South, have been acquired by three Canadian firms (i.e., West Fraser, Canfor and Interfor) since 2000 in response to the softwood lumber agreement, the mountain pine beetle infestation in British Columbia and the strong Canadian dollar (at the time of our study). Based on this study, Canadian firms have a higher international orientation. Understanding how these ownership changes will influence regional and international forest products flows in the future would be an interesting area to investigate.

It is important to note that this is a cross-sectional study. Even by entering inputs to enhance the theoretical support of the model, results reveal correlations rather than causation. There could be

521 confounding factors (e.g., antecedent factors) that influence both the dependent variables and the
522 independent variables simultaneously. More importantly, this is just a snapshot of the dynamic
523 lumber industry as of 2011. Continuously monitoring the internationalization process of the sawmill
524 sector, through both qualitative and quantitative research, will make a significant contribution not
525 only to the forest products field but also to the international business field.

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Table 1. Estimated factor loadings for differentiation strategy of firms

Item Scales		Standardized loadings	Std. Error	
1	We offer customized products rather than standardized products.	0.538	0.122	***
2	We strive to improve product quality even if it costs more.	0.653	0.126	***
3	We target niche markets rather than the generalist market.	0.714	0.128	***
4	We compete on price rather than on product quality in the market. [reverse]	-0.323	0.125	***

Note: *** represents significant difference at the 1% level.

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Table 2. The level of internationalization commitment and location of firms

	Canada	US	PNW	South	NE
0) Sell to Domestic Market Only	0	26	11	9	6
1) Indirectly Export	1	16	4	5	7
2) Directly Export to either US or Canada only	13	7	1	0	6
3) Directly Export outside of North America	10	16	11	3	2

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Table 3. Descriptive statistics and correlation between dependent and independent variables.

Concepts	#	Factors	Mean	St.Dev.	Median	Correlations (vs #)							
Int'l Business Activities #													
Internationalization	DV	(0-3)	1.52	1.20	2	DV	vs 1	vs 2	vs 3	vs 4	vs 5	vs 6	vs 7
Geo Location	1	US ‡ (1=US, 0=Canada)	(0.73)		(1)	-0.424	1						
Geo Location	2	South‡ (1=south, 0=elsewhere)	(0.22)		(0)	-0.339	0.327	1					
Integration	3	Forest Owned‡ (1=owned, 0=not owned)	(0.33)		(0)	0.126	0.098	0.200	1				
Size	4	log(Capacity)	4.35	1.36	4.38	0.242	0.000	0.121	0.268	1			
Differentiation	5	Diff. Orientation	-0.02	0.83	-0.06	0.217	0.043	-0.264	0.136	-0.163	1		
Differentiation	6	Prod. Diversity (0-6)	1.99	1.21	2	0.398	-0.140	-0.101	0.168	0.475	-0.009	1	
Profitability	7	Profitability # (1-5)	3.69	0.90	4	0.156	-0.111	-0.080	0.157	0.273	0.087	0.164	1
Experience	8	Year	51.52	27.35	50	0.143	-0.030	0.168	0.349	0.254	0.054	0.226	0.069

Note: ‡ and † represent ordinal and nominal scale variables, respectively. The mean and the standard deviation of ordinal scale variables are calculated assuming them as pseudo-interval variables in order to better understand the distribution. The mean values of nominal scale variables are the proportion of the number one category.

Spearman's rank correlation was applied with ordinal/nominal scale; otherwise, Pearson's correlation was applied.

Table 4. Model estimations of the ordinal hurdle regressions

	Full Model			The Best Parsimonious Model			
	P.E.	S.D.	z-test	P.E.	S.D.	z-test	
Hurdle							
(Intercept)	-1.171	0.858	-1.365	-1.151	0.569	-2.023	***
South†	-0.437	0.472	-0.925				
Forest Owned†	0.433	0.429	1.011				
Diff. Orientation	0.288	0.260	1.109				
log(Capacity)	0.346	0.160	2.164	***	0.369	0.134	2.762 ***
Prod Diversity	-0.012	0.193	-0.061				
Profitability	-0.005	0.210	-0.022				
Year	0.002	0.007	0.226				
South*Diff	0.677	0.575	1.178	1.213	0.458	2.649	***
Ordered Regression							
(Intercept)	0.009	0.811	0.011	-0.292	0.319	-0.917	
USA†	-0.488	0.347	-1.407				
South†	-0.581	0.490	-1.185	-0.780	0.447	-1.747	*
Forest Owned†	-0.151	0.357	-0.422				
Diff. Orientation	0.447	0.243	1.838	*	0.307	0.207	1.482
log(Capacity)	0.018	0.139	0.128				
Prod Divers.	0.539	0.162	3.329	***	0.544	0.139	3.903 ***
Profitability	-0.062	0.180	-0.343				
Year	0.004	0.006	0.595				
South*Diff	-0.380	0.540	-0.703				
τ^2	1.082	0.210	5.148	***	1.040	0.201	5.169 ***
loglikelihood	-90.6				-93.8		
AIC	219.2				201.6		
BIC	266.5				219.1		

Note: ***, **, * represent significant difference at the 1%, 5%, and 10% level respectively.

† represents dummy variable.

PE and SE represent point estimates and standard errors of coefficient, respectively.

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Figure 1. Conceptual framework of Augmented Internationalization Process (AIP) model of SMEs for North American softwood sawmill business.

Figure 2. Counterfactual probabilities to sell only domestic market or to export offshore marketss by a hypothetical sawmill firm located in i) Southern US, ii) Northern US and iii) Canada using a simulation-based technique. In this senario, hypothetical sawmill firms vary production capacity. The central lines represent the point estimates, and the shading is the one-standard deviation confidence interval around the mean.

Figure 3. Counterfactual probabilities to sell only domestic market or to export offshore marketss by a hypothetical sawmill firm located in i) Southern US, ii) Northern US and iii) Canada using a simulation-based technique. In this senario, hypothetical sawmill firms vary number of value-added products they produce. The central lines represent the point estimates, and the shading is the one-standard deviation confidence interval around the mean.

i) Southern U.S.

ii) Northern U.S.

iii) Canada