Credit Availability: A Possible Barrier to Growth for the Alaska Forest Products Industry?

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ABSTRACT: *Historically, the Alaska forest products industry has been driven by pulp production and the export of logs and cants primarily to Japan. Economic stagnation in Japan, the closure of Alaska's two pulp mills, harvest restrictions, and increased competition have severely impacted the industry. To survive, the industry must make significant investments in capital equipment, which requires adequate access to business credit. This article examines whether credit availability is a barrier to the future growth of the industry. Data were collected through a mail survey in spring 2002. Our results show that credit rationing is prevalent throughout the industry. Lack of experience and low collateral are identified as the two main causes. An educational program and loan guarantees are offered as policy prescriptions to help alleviate credit rationing. West. J. Appl. For. 20(3):177-183.*

Key Words: Alaska forest products industry, credit rationing, economics, policy.

Historically, the Alaska forest products industry has been driveln by pulp production and the export of logs and cants primarily to Japan. However, Alaska's two pulp mills in Sitka and Ketchikan closed in 1993 and 1997, respectively. In addition, a decade of poor economic growth has significantly reduced Japanese demand for lumber. Japanese housing starts have declined 28% from 1.7 million in 1990 to 1.23 million in 2000 (Eastin and Braden 2000). Total solid wood product exports from Alaska to Japan declined 71 % between 1989 and 1998. Further exacerbating the problem, the remaining Japanese market is becoming more competitive, with Alaska producers losing market share to European, Canadian, and Pacific Northwest producers (Eastin and Braden 2000). This reduction in exports, in combination with the closure of Alaska's two pulp mills, has contributed to a 91 % decline in timber harvest volumes from national forests in Alaska, from 472 million board feet (MMBF) in 1990 to 44 MMBF in 2001 (USDA Forest Service 2001).

Lower productivity at Alaska mills is partially responsible for the industry's competitive position. Kilborn (2002) found that lumber recovery rates at sawmills in Alaska were significantly lower than in British Columbia and the Pacific Northwest. Because Alaska has predominantly produced pulp and cants, current industry infrastructure is inadequate to compete successfully in the production of kiln-dried lumber. For example, Nicholls and Kilborn (2001) found that Alaska's total installed dry kiln capacity was less than 100 MBF.

To improve growth and achieve increases in productivity, the forest products industry must invest in capital equipment. A necessary condition for this new investment is access to adequate business credit. We surveyed businesses in the Alaska forest products industry about their experiences obtaining credit to determine if credit availability is a barrier to future growth.

Literature Review

In a perfectly competitive credit market, all borrowers have access to credit at the prevailing interest rate (Stiglitz and Weiss 1981). In practice, however, many potential lenders do not have access to sufficient credit even when the financial institutions they are applying to have sufficient deposit availability. This leads to inefficient markets where investors cannot acquire necessary financial capital and lenders forego interest income. This situation is known as credit rationing and can take several forms: rejected applicants, rationed or reduced loan amount, and preemptive

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rationing when potential applicants do not apply (Pickering and Mushinski 2001).

A cause of credit rationing that has received much attention in the literature is asymmetrical information, which usually arises when a borrower knows more than a lender about their own ability and desire to repay a loan (Stiglitz and Weiss 1981). When faced with information asymmetry, lenders may use interest rates and collateral requirements to sort low- from high-risk borrowers (Besanko and Thakor 1987). The use of interest rates alone, however, may result in adverse selection and moral hazard. Raising interest rates charged on loans causes applicants with the lowest chance of failure to drop out of the credit market first, hence adverse selection. Moral hazard occurs when higher interest rates cause applicants to select investment projects with a higher chance of failure than they would have at a lower interest rate.

Interest rates, in combination with collateral requirements, can be used to sort low- from high-risk borrowers (Bester 1987). Loans with a low interest rate and high collateral requirement will be attractive to low-risk borrowers, but not to high-risk borrowers. In addition, collateral requirements encourage borrowers to select low-risk projects. However, collateral requirements may prevent some low-risk borrowers with little collateral from obtaining credit.

Transaction costs may also cause credit rationing and are a particular problem for banks making small loans where such costs represent a significant percentage of the requested principal. Furthermore, several studies have shown that the time and expense of applying for a loan is a significant deterrent for potential borrowers, thus leading to preemptive rationing (Ladman 1984).

Although credit rationing is an important issue for the forest products industry, particularly to timber-dependent communities in rural areas, the subject has not received widespread attention. Ollikainen (1996) examined the effect of credit rationing on harvesting decisions from a theoretical basis and showed that, contrary to previous exogenous models of credit rationing, the harvest decision is independent of landowners' preferences. Kuuluvainen (1990) studied the effect of credit rationing on nonindustrial forest owner's preferences, concluding that total effects were independent of the degree of credit rationing. Studies outside of forestry have focused primarily on rural development (Ladman 1984, Fenwick and Lyne 1998, Selvaraj and Srinivasan 1997).

Methods

We contacted businesses in the forest products industry in Alaska through a mail survey and used an analysis of variance (ANOVA) to study the results. Credit rationing was assumed to take three forms: preemptive rationing, quantity rationing, and rejected applications.

Respondents were asked to select from 11 possible primary business activities: traditional cultural products, logging, saw milling, log home manufacturing, gifts and artwork, furniture and cabinet making, musical instrument manufacturing, boat building, nontimber products, and other. Several of the business categories had few responses so the categories were combined to form three new categories: primary manufacturing (logging and saw milling), gifts and artwork, and secondary manufacturing (all other categories except other). This allowed the following null and alternative hypotheses to be tested using ANOVA:

Ho Preemptive rationing, quantity rationing, rejected applications, and application rates are equal across business activity classes.

H_A Preemptive rationing, quantity rationing, rejected applications, and application rates differ across business activity classes.

To determine if businesses in different regions of Alaska experienced different rates of credit rationing, the sample was divided into three categories: southeast, south-central, and interior (unsurprisingly, there were no responses from southwest Alaska). ANOVA was used to test the following null and alternative hypotheses:

Ho Preemptive rationing, quantity rationing, rejected applications, and application rates are equal across regions.

H_A Preemptive rationing, quantity rationing, rejected applications, and application rates differ across regions.

Finally, we were interested in the factors that influence a business' decision to apply for a loan or grant, and those factors that influence the success of that application. Therefore, the sample was divided into those respondents who had successfully applied for a loan or a grant, those whose application had been rejected, and those who had not applied. This allowed the following null and alternative, hypotheses to be evaluated using ANOVA:

Ho Median amount of loan or grant application, median years in business, use of alternative sources of credit is equal across classes.

H_A Median amount of loan or grant application, median years in business, use of alternative sources of credit differ across classes.

Survey Design, Protocol, and Structure

The survey was administered by the University of Alaska Southeast and mailed to 421 members 'of the Alaska forest products industry in spring 2002. The package included prepaid, return envelopes and a survey with 14 questions pertaining to credit availability. The first question established if the respondent had applied for a loan or grant in the past 5 years. If they had, they were asked to provide the type of organization applied to, the amount requested, and whether the application was rejected. If loans or grants were provided, respondents noted if the amount was in full or less than the requested amount.

Respondents who considered but did not actually apply for a loan or grant were asked the reason they chose not to apply. Respondents were also asked if they had used other

forms of business credit such as personal credit cards or loans from family members. Finally, respondents recorded gross annual business revenue in 2001, zip code, and years in operation.

To obtain wide coverage of the industry, mailing lists from the Alaska Wood Products Directory and the Alaska Wood Utilization Center in Sitka (Parrent 2000, WUC 2002) were combined and edited for duplication. A four-contact methodology was used based on Dillman (2000), which yielded 190 responses out of a possible 421, (161 first wave and 29 second wave), a response rate of 45.1 %. This compares favorably to other industrial surveys. For example, Paxson (1992) conducted a review of 183 business surveys and found that the average response rate was 21 %.

Results

Descriptive Statistics

Of the 190 businesses that responded to the survey, 23% had applied for a loan in the last 5 years, 14% had applied for a grant, and 63 % had applied for neither. The subset of the population that had applied for either a loan or a grant was asked which type of institution they had applied to. The results showed that applicants applied primarily to banks (58.6%) and federal agencies (25.7%). Other sources included state agencies and universities (2.9%), and Native corporations (1.4%). No businesses in the sample applied to municipal agencies or venture capital firms.

Those respondents whose applications were rejected (30.1%) were asked why. The predominant reason for rejection was insufficient business collateral (31.8%). The next reason was a high-risk business plan (18.2%), followed by poor credit rating (13.6%). Unspecified other reasons accounted for 36.4% of responses. Incomplete applications did not account for any rejections.

Of the 38.8% of respondents who considered applying for a loan or grant but did not (preemptive rationing) the primary reason given was that they believed their chances of success were too low (37.1%). Other reasons included lack of experience (31.4%), the time and expense of the application process (20.0%), low collateral (10.0%), and prohibitively high interest rates (1.4%).

Finally, respondents were asked if they had used either a personal credit card or a loan from family members for business credit in the last 5 years. Personal credit cards had been used by 62.2% of the sample, 19.4% had received a loan from a family member, and the remaining 20.4% had used neither.

Credit rationing can be caused by lenders using higher interest rates to sort loan applicants. This type of rationing, however, does not appear to be prevalent in the Alaska forest products industry, as high interest rates were cited as the main reason for not applying for a loan or grant by only 1.4% of the sample. In contrast, lack of experience or the time and expense of the application process were cited as the main reason for not applying for a loan or grant over half of the time, suggesting that the application process is a significant deterrent to many in the sample. This is consistent with the high incidence (62.2%) of using personal credit cards for business use. Although credit cards often charge higher interest rates than banks, applying for and using them requires little time and expertise.

Table 1 indicates how many responses were received in each business category, median years in business, median income, and how often personal credit cards and family members were used for business credit.

The largest business activity, in terms of number of responses, is gifts and artwork. The low median income of this category ($10,000) suggests that many of these businesses are small and are not the sole income source for the business owner. Consequently, the total revenue generated by this category is lower than the sawmill, logging, and other categories. The median years in business (4) are also the lowest in the sample.

The log home manufacturing and retail] categories had the highest median incomes ($375,000 and $750,000, respectively) and among the highest years in business (15.5 and 18.5, respectively). However, as each category had relatively few responses, the total revenues of the log home manufacturing and retail categories were fifth and sixth overall.

[1] Retail businesses were not intended to be part of the original sample, primarily to avoid double counting revenues. However, four businesses answered that retail was their primary business activity.

Table 1. Business activities.

Business activity	No. of responses	Total revenue ($1,000)	Median years in business	Median income ($)	Use of personal credit cards (%)	Loans from family members (%)
Traditional cultural products	1	10a	15.5[a]	100,000*a*	100[a]	0*a*
Boat building	1 .	38[a]	8a	37,500[a]	100°	0*a*
Music	4	170	12	42,500	75	0
Nontimber products	8	383	8	13,750	37.5	12.5
Furniture/cabinet making	13	1,478	15.5	37,500	69	38
Retail	4	1,825	18	750,000	50	25[a]
Log Home manufacturing	7	2,380	15.5	375,000	71	0
Gifts/artwork	69	2,575	4	10,000	77	16
Sawmill operation	41	8,678	15.5	75,000	56	27
Logging	18	5,873	15.5	75,000	50	28
Other	24	7,808	12	175,000	33	8

a Indicates only one respondent.

The median income ($75,000) of the sawmill and logging categories were not the highest in the sample. However, due to the number of businesses in each category, sawmills had the highest total revenue in the sample, and logging the third. In addition, the median years in business were high for both categories (15.5).

The use of personal credit cards for business purposes was common across business categories, but most prevalent in the gift and artwork and musical instrument manufacturing categories. Family members were also commonly used as a source of business credit, though less so than personal credit cards. Primary processors and furniture and cabinet makers were most likely to have received a loan from family members. The gift and artwork category showed the biggest difference between the use of personal credit cards and family members for business credit. This difference may imply that credit cards are used for small amounts of credit, whereas family members are used for larger loans. Given the small median income of the gifts and artwork category, members of this category would be less likely to require larger loans from family members.

Application rates varied greatly across business categories (Table 2), with businesses in the logging and sawmilling categories having the highest application rates. The application amount, as a proportion of annual revenue, was also relatively high. The gifts and artwork category had the lowest application rate, though the applications that were made were relatively large. Excluding categories with only one response, the gifts and artwork category also experienced the highest rejection rate (40%). The rejection rate of the logging and sawmilling categories were also relatively high (30 and 35.5%, respectively).

Analysis

Data were analyzed using ANOVA to determine if business type, geographic region, and success characteristics influenced the degree of credit rationing experienced. Findings are discussed for each category.

Business Type

The sample was divided into three categories (primary, secondary, and gifts and artwork) to determine if business categories experienced different rates of credit rationing. Table 3 shows preemptive rationing, quantitative rationing, and rejection rates by business activity.

The gifts and artwork category experienced the highest rejection rate, followed by primary processing. Interestingly, the relative size of the application was not correlated with the rejection rate. Although the primary processing categories experienced high rejection rates, their rates of quantity rationing were the lowest in the sample.

Table 4 shows the ANOVA results for business activity. We tested application rates, rejection rates, preemptive rationing, and quantity rationing. Of these four, application rate ($P < 0.000$) and quantity rationing exhibited significant differences ($P < 0.057$), while rejection rate and preemptive rationing did not.

Region

The sample exhibited significant regional variation in median income and years in business. The principal reason for this regional variation is the concentration of primary processing businesses in southeast Alaska; these businesses have higher median incomes and more years in business than the sample as a whole. Furthermore, southeast Alaska has disproportionately fewer businesses in the gifts and artwork category; these businesses have lower median incomes and fewer years in business than the sample as a whole. Table 5 shows rates of credit rationing by region.

Respondents in south-central Alaska experienced the greatest rejection rate (41 %). However, respondents in the interior had the highest percentage of reduced loans (29%). Respondents in southeast and south-central Alaska experienced preemptive rationing at rates of 40 and 44%, respectively, whereas those in the interior registered only 29%. Of the four categories, only application rate exhibited significant regional differences ($P < 0.007$) (Table 6).

Determinants of a Successful Application

To determine which factors influence a business' decision to apply for a loan or grant, and the success of that application, the sample was divided into businesses that did not apply for a loan or grant, those that successfully applied, and those whose application was rejected. The reasons given for not applying reveal some interesting differences between businesses that had an application rejected and the rest of the sample (Table 7). Low collateral was never cited as the primary reason for not making an application by respondents who had an application rejected. In contrast, as

Table 2. Loan amount distribution.

Business	Application rate (%)	Application amount ($)	Rejection rate (%)	Application as a proportion of revenue
Traditional cultural products	0.0[a]	NA	NA	NA
Logging	55.6	175,000	30	2.3
Sawmill operation	75.6	75,000	35.5	1
Log home manufacturing	28.6	143,750	0	0.4
Gifts/artwork	7.3	17,500	40	1.8
Furniture/cabinet making	38.5	75,000	20	2
Music	25.0[a]	17,500[a]	100a	0.4[1]
Boat building	100[a]	17,500[1]	0.0[a]	0.5[a]
Nontimber products	50[a]	143,750[1]	0a	10.5[a]
Retail	25.0[a]	250,000[a]	0.0[a]	0.3[a]
Other	41.7	125,000	20	0.7

[1] Indicates only one respondent.

Table 3. Credit rationing by business activity.

Business activity	Application rate	Rate of preemptive rationing	Rate of quantitative rationing	Rejection rate
Primary manufacturing	71.9	37.3	14.6	34.2
Secondary manufacturing	38.7	40.3	25	20.7
Gifts/artwork	7.3	37.7	60	40

Table 4. ANOVA results by business activity.

Source of variation	SS	*df*	*MS*	*F*	P value	*F* crit
Application rate by business activity						
Between groups	12.3	2	6.177	36.3	4.91E-14	3.044
Within groups	31.8	187	0.170			
Total	44.2	189				
Rejection rate by business activity (between primary and secondary only)						
Between groups	0.533	2	0.266	1.29	0.279	3.13
Within groups	13.8	67	0.205			
Total	14.3	69				
Preemptive rationing by business activity						
Between groups	0.0337	2	0.0168	0.0702	0.932	3.044
Within groups	44.9	187	0.240			
Total	45.0	189				
Quantity rationing by business activity						
Between groups	0.964	2	0.482	2.98	0.057	3.13
Within groups	10.8	67	0.162			
Total	11.8	69				

Table 5. Credit rationing by region.

Region	Rejection rate	Rate of quantity rationing	Rate of preemptive rationing	Application rate
Southeast	29.4	17.7	40.0	52.3
South-central	40.9	18.2	44.3	27.8
Interior	17.7	29.4	29.4	33.3

Table 6. ANOVA results by region.

Source of variation	SS	*df*	*MS*	*F*	P value	*F*
Application rate by region						
Between groups	2.25	2	1.12	4.973	0.007	3.04
Within groups	43.4	192	0.226			
Total	45.7	194				
Rejection rate by region						
Between groups	0.522	2	0.261	1.23	0.298	3.13
Within groups	14.8	70	0.212			
Total	15.4	72				
Quantity rationing by region						
Between groups	0.174	2	0.0872	0.52	0.596	3.13
Within groups	11.7	70	0.168			
Total	11.9	72				
Preemptive rationing by region						
Between groups	0.698	2	0.349	1.47	0.233	3.04
Within groups	45.7	192	0.238			
Total	46.4	194				

previously stated, low collateral was the main reason given by financial institutions for rejecting a loan or grant application. This disparity suggests that respondents who experienced preemptive rationing underestimated the importance of collateral. Successful and rejected applicants applied to different types of financial institutions in broadly the same proportions. Rejected applicants, however, applied for larger loans or grants.

Table 8 provides the ANOVA results for the comparison between successful and unsuccessful applicants. These groups were tested to determine if the use of family members for loans, use of credit cards, total revenue, and years in business were different between the two groups.

The use of family members for loans was more prevalent among rejected applicants ($P < 0.0005$), as was the use of personal credit cards for business purposes ($P < 0.042$). Respondents were not asked if the use of these alternative sources of credit was precipitated by a rejected loan or grant application. Therefore, we cannot determine if credit requirements were met by these alternative sources. However, given a median application amount of $125,000, it seems reasonable to assume that many businesses were unable to

Table 7. A comparison of successful applicants, unsuccessful applicants, and nonapplicants.

	Applied and offered (*n* = 51) (%)	Applied and rejected (*n* = 22) (%)	Did not apply (*n* = 123) (%)
Main reason for rejection			
Incomplete application	NA	0	NA
Business collateral was too low	NA	31.8	NA
Business plan was too risky	NA	18.2	NA
Business credit rating was too low	NA	13.6	NA
Other	NA	36.4	NA
Thought about applying but did not			
Yes	31.4	50	39.8
No	68.6	50	60.2
Main reason for not applying			
Experience	25	10	38.6
Time and expense	31.3	30	13.6
Low collateral	12.5	0	11.4
Low chances	31.3	60	34.1
High interest	0	0	2.3
Median amount applied for	$75,000	$125,000	NA
Type of credit used			
Credit card	49	77.3	65
Family members	15.7	50	15.4

Table 8. Characteristics of rejected versus successful applications.

Source of variation	SS	*df*	*MS*	*F*	*P* value	*F* crit
Family members						
Between groups	2.32	2	1.16	7.92	0.0004	3.04
Within groups	28.3	193	0.147			
Total	30.6	195				
Credit cards						
Between groups	1.49	2	0.743	3.21	0.0423	3.04
Within groups	44.6	193	0.231			
Total	46.1	195				
Revenue						
Between groups	1.69E+ 12	2	8.47E+ 11	10.9	3.46E-05	3.04
Within groups	1.47E+ 13	189	7.8E+ 10			
Total	1.64E+ 13	191				
Years in business						
Between groups	443	2	222	5.58	0.0044	3.04
Within groups	7,684	193	39.8			
Total	8,128	195				

raise the full amount of the rejected loan or grant from family members or credit cards. Finally, there was a significant difference in both business revenue and years in business between the two groups. This is not surprising as businesses with higher revenue probably have higher collateral and those who have been in business longer may have a more established financial reputation.

Discussion

This study shows that businesses in the Alaska forest products industry have experienced preemptive rationing, quantity rationing, and rejected applications in the last 5 years. The use of collateral requirements by financial institutions has significantly affected the degree of credit rationing experienced by the industry. In contrast, interest rates over the last 5 years have deterred few businesses from seeking credit.

Application rates varied significantly across business categories, with primary manufacturers the most likely to apply for a loan or grant. The structural changes in the Alaska forest products industry over the last 10 years have been felt most acutely in primary manufacturing. Therefore, it is not surprising that these businesses are the most likely to apply for credit. The gifts and artwork category had the lowest application rate in the sample. The high use of alternative sources of credit suggests that traditional loans or grants are not attractive sources of capital for businesses in this category. To better serve this segment of the market, financial institutions could streamline the application process for small business loans.

The sample exhibited regional differences in median income, years in business, and application rate, largely due to the high concentration of primary processing businesses in southeast Alaska, which have higher median incomes, years in business, and application rate than the sample as a whole.

The reasons given for not applying for a loan or grant provide insight into possible policy prescriptions. Over half the sample cited lack of experience or the time and expense of the application process as the main reason for not applying for a loan or grant, suggesting that an educational program that helps prospective applicants with loan applications may reduce credit rationing. Prospective applicants would benefit from better understanding the factors that financial institutions consider when reviewing an application, in particular the importance of collateral.

The problem of low collateral could be addressed through the Alaska National Interests and Land Conservation Act of 1980 (ANILCA). Section 705 (b)(1) states, "The secretary is authorized and directed to establish a special program of insured or guaranteed loans to purchasers of national forest materials in Alaska to assist such purchasers in the acquisition of equipment and the implementation of new technologies which lead to the utilization of wood products which might otherwise not be used." ANILCA was passed in 1980, but Section 705 (b)(1) was never appropriated. Such a loan guarantee program, if implemented, should reduce the incidence of credit rationing by reducing the need for businesses to provide collateral for loan applications.

The forest products industry in Alaska has been significantly reduced in size in the last 10 years. In the future, the industry will not be driven by the export of pulp and cants, as it was in the past. To survive, the industry must diversify, which requires capitalization and a significant boost in productivity. Results from this study show that credit availability may be a limiting factor to industry diversification and growth. However, we conclude that education and a loan guarantee program have the potential to reduce this barrier to growth.

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