

Willingness to Pay for Environmentally Certified Hardwood Products by Tennessee Consumers

by

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Abstract

Forest products certification programs may include the goals of increasing consumer acceptance and differentiating products. This study examines Tennessee consumers' market participation for environmentally certified hardwood products, potential premiums paid for selected hardwood products, and effects of scope of certification and demographics on market participation and premium amounts.

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Introduction

Environmentally certified wood products constitute an emerging market with major home improvement chains making commitments to support or give preference to environmentally certified products (examples include Home Depot and Lowe's). While primary objectives of forest products certification programs are to improve environmental quality and to promote sustainable forest management (Cabarle, *et al.*), voluntary certification programs constitute market-based tools that can be used to differentiate products on the basis of their "green" certification. Effective use of a market-based tools, such as voluntary certification programs, not only requires modifying manufacturer behavior, but also developing consumers' willingness to pay for certified products. Marketing goals associated with certification programs may include increasing consumer acceptance of, confidence in, and willingness to pay for certification programs, increasing market share, and product differentiation.

The costs of certification entail certification review costs along with costs associated with improved management practices (Carter and Merry). These costs may vary greatly depending on the degree to which a product is certified. The scope of certification may be at only one level of the product's life cycle (*e.g.*, certification at the timber growing and harvesting level only) or may assess impacts environmental impacts throughout a product's life cycle (Welch).

The purpose of this study is to ascertain:

- Tennessee consumers' willingness to participate in a certified market by paying a premium for environmentally certified products,

- the premium amount Tennessee consumers would be willing to pay for selected hardwood products (in this study, an oak chair and an oak shelving board), and
- how the scope of certification and demographics may influence market participation and willingness to pay for certified products.

The study differs from previous studies of consumers' attitudes and willingness to pay for certified products in several ways. *First*, this study incorporates an analysis of effects of scope of certification on whether consumers would be willing to pay more for certified products. *Second*, the respondents are allowed to express support for environmental certification, but not if it costs them more. Respondents are also allowed to state that they do not support environmental certification whether it costs them anything. By allowing respondents to express support for environmental certification without being willing to pay higher prices, bias associated with "yea saying" may be minimized (Blamey, Bennett, and Morrison). In other words, any pressure to provide a "socially responsible" response of support for the environment may be decreased, providing a more realistic estimate of consumers' behavior in the marketplace. *Third*, prior to answering questions regarding prices for environmentally certified products, the respondents are asked to read a section on making hypothetical choices and to answer the questions about the products as realistically as possible. The respondents are also reassured that some people may be willing to pay more for environmentally certified products, while others may not. Respondents are also reminded of their budget constraints. The purpose of including this section in the survey is to obtain more realistic estimates of premiums paid for specific products (Kotchen and Reiling; Cummings and Taylor). *Fourth*, products of varying price levels (ranging from a relatively low-cost shelving board to a relatively high-cost chair) are examined to see how the

level of the expenditure might influence the premium amount consumers would be willing to pay for the certified hardwood product.

Previous Studies

Several studies have examined consumers' willingness to pay for environmentally certified wood products. These studies have produced mixed findings regarding the percents of consumers who would be willing to pay a premium. Ozanne and Vlosky (1997) found that about 63 percent of consumers would pay more for certified wood products. A limitation of this study was that it only included adult homeowners with incomes of \$30,000 or more. Winterhalter and Cassens (1993) also found that among consumers with single or dual incomes of \$50,000 or greater, a majority (81 percent) would be willing to pay a premium for certified wood furniture. Again, as with Ozanne and Vlosky's study, this study was targeted to higher income consumers. Grönroos and Bowyer (1999) assessed the market potential for environmentally certified wood products in new homes in Minneapolis/St. Paul and Chicago. The majority of the respondents, 76 percent for Minneapolis/St. Paul and 64 percent for Chicago, were not willing to pay a premium.

Several studies have attempted to identify profiles of those most likely to buy certified wood products. Forsyth, *et al.* (1999) examined differences in willingness to pay for certified products across several demographic characteristics: gender, place of residence, age, income and market segment (consumer or professional). No specific products were identified in the study, rather the broader category of wood products was examined. Their findings were suggestive of a profile for those most likely to buy certified products (female, urban, young, and lower income), however, no statistical differences were found. Therefore, no clear conclusions about those most likely to buy certified products could be drawn. Ozanne and Vlosky (1997) and Ozanne and

Smith (1998) found the consumer segment most likely to buy certified products is female, a member of the Democratic Party, members of environmental organizations, and politically liberal. Spinazze and Kant (1999) examined the correlation between gender and education and premiums. For all the products examined, the differences in premiums by women and men were statistically different. However, no significant difference was found in premiums between individuals with less than a university and those with a university education.

Based on findings from previous studies, the percent of consumers who will pay a specified premium declines with the level of the premium. The percent premium consumers will pay also declines with the value of the product. In a study of European consumers willingness to buy certified forest products, an inverse relationship between willingness to buy and price was found (Rametsteiner, *et al.* 1999). Rametsteiner, *et al.* found if the price of the certified product was 150 percent of the original price, willingness to pay was decreased by 20 percent. Ozanne and Vlosky (1997) found that among consumers willing to pay a premium, consumers would pay 18.7 percent more for a \$1 stud, 14.4 percent more for a \$100 ready to assemble chair, 14.2 percent more for a \$1,000 dining room set if they were certified, and 4.4 percent on a \$100,000 home. According to Forsyth, *et al.* (1999), approximately 94.3 percent of the interviewees would choose the certified wood product if it was priced the same as the non-certified wood product. About 67.3 percent would pay a five percent premium, 28.3 percent would pay a ten percent premium, and only 13 percent would pay more than a ten percent premium.

Study Objectives

The objective of this study is to ascertain Tennessee consumers' market participation for environmentally certified hardwood products and the premium amount they would pay for

example certified hardwood products. Specific goals are to:

- measure the level of support and market participation for certified hardwood products,
- assess the level of premiums consumers will pay for example certified hardwood products (oak shelving board and an oak chair),
- assess how socioeconomic and demographic factors and attitudes toward the environment may influence market participation and willingness to pay, and
- develop market participant profiles for certified hardwood products.

Survey Data and Methods of Analysis

Survey Data

The survey data was collected in two phases. First, a preliminary mail survey of Tennessee residents was used to develop premium vectors to be used in the field survey (following Boyle, *et al.*). Second, a telephone/mail/telephone field survey of Tennessee residents was conducted.

In the surveys, respondents were provided a definition of environmental certification:

Environmental certification means a product has passed a voluntary environmental screening process by an independent third party organization (not the wood products company, the wood products industry, or the government).

Half of the respondents were randomly assigned to a “partial” scope of certification program and half were assigned to a “full” scope of certification program. In the “partial” certification program, only timber growing and harvesting methods would be monitored. In the “full” certification program, timber growing and harvesting, product processing, and product handling would be monitored (See Figure 1).

Timber growing and harvesting methods, product manufacturing, and product handling would be monitored to ensure that practices are used that help sustain our environment for current and future generations.

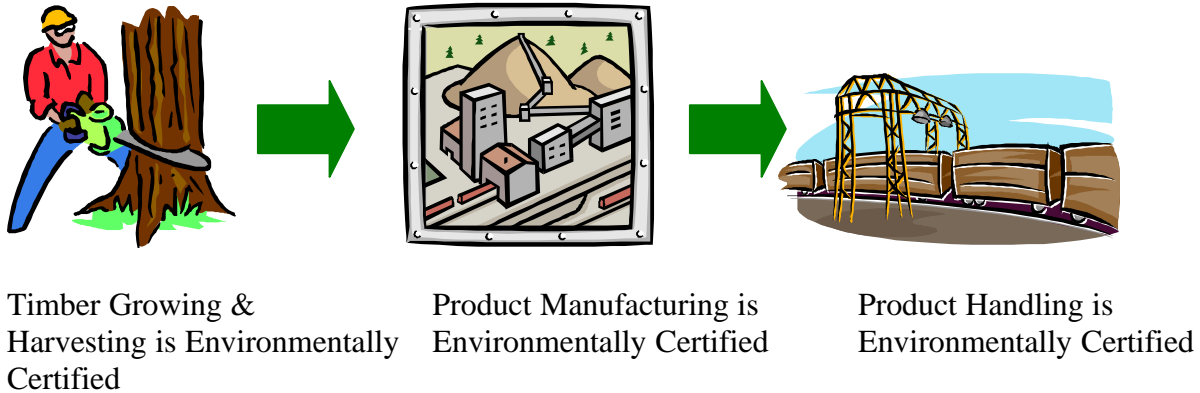


Figure 1. Pictorial Depiction of Full Scope of Environmental Certification

The respondents were then asked if they support certification of hardwood products and whether they would pay more for certified hardwood products. The respondents were offered three statements. The first statement read, “I support environmental certification and would pay a higher price for hardwood products if they were certified”. The second statement was, “I support environmental certification but not if it requires paying a higher price for hardwood products”. The third statement was, “I do not support environmental certification regardless of whether it costs me anything”. By allowing respondents to express support for environmental certification without being willing to pay higher prices, bias associated with “yea saying” may be minimized (Blamey, Bennett, and Morrison 1999). In other words, any perceived pressure to provide a “socially responsible” response of support for the environment may be decreased, providing a more realistic estimate of consumers’ behavior in the marketplace.

If the respondents answered that they would pay more, they were then asked about their willingness to pay for example certified products (an oak shelving board and an oak chair). In the case of the pre-test the amount of the premium was not specified, and the respondents were asked to provide the premium they would pay on a \$28.80 uncertified oak shelving board and a \$199 oak chair. In the case of the field survey, a referendum style question was used where the respondent was offered a premium and asked whether they would purchase the certified product at that premium. For the field survey, respondents were mailed an information booklet about the specified hardwood products. Product pictures and dimensions were provided in the surveys (See Figure 2). The certified products were described as identical to the uncertified products in every way except for the certification.

Prior to answering questions about premiums for the certified products, respondents were reminded about difficulties in making hypothetical choices. The respondents were reassured that some people might be willing to pay more for environmentally certified products, while others might not. Respondents were also reminded of their budget constraint in the booklet. The purpose of including this section in the survey was to obtain more realistic estimates of premiums paid for specific products (Kotchen and Reiling 1999; Cummings and Taylor 1999).

Pretest subjects were drawn from a random sample of Tennessee residents listed in telephone directories. A survey research firm drew 500 names/addresses. The sample was stratified, with no more than 200 names coming from the four major urban counties in the state (Davidson, Hamilton, Knox and Shelby). A total of 76 responded to the pre-test survey. Of the pre-test respondents, 37 percent supported certification and would be willing to pay some premium, 54 percent supported certification but would not pay more, and 9 percent did not support certification. The median and quintile premiums for the shelving board and chair, along

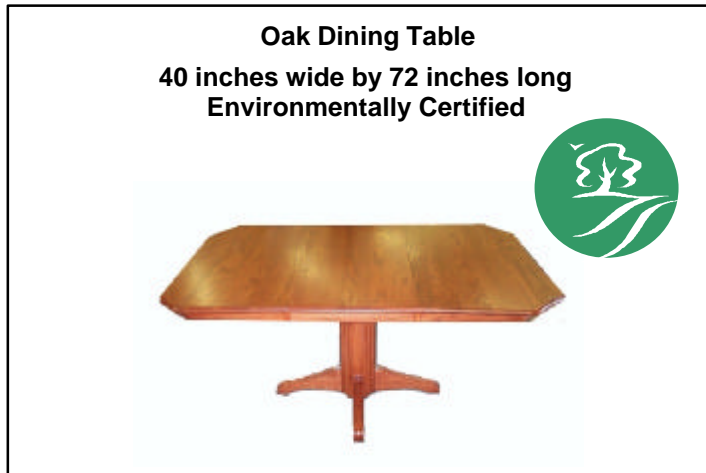


Figure 2. Example Products' Pictures and Dimensions.

with bootstrapped estimates of the means and confidence intervals, were used as a guide for premium vectors for the certified products in the field survey.¹ The median premium for the certified shelving board was \$5.00 (uncertified product was \$28.80) and for the chair was \$20.00 (uncertified product was \$199.00).² The bootstrapped mean and confidence intervals deviations of the premiums are displayed in Table 1. Based on these results, the premium vectors for the shelving board and chair shown in Table 2 were developed.

Table 1. Bootstrapped Premium Means and Confidence Intervals from 1,000 Replications.

	Mean Premium	95 Percent Confidence Interval	
		Lower Bound	Upper Bound
Shelving Board	4.97	3.44	6.76
Chair	24.62	18.08	32.45

Table 2. Premium Vectors for Certified Products Presented in Information Booklet

Shelving Board (\$28.80 Uncertified Product)	Chair (\$199 Uncertified Product)
\$1.50	\$10
\$4.00	\$15
\$5.00	\$20
\$6.00	\$25
\$10.00	\$40

The field survey consisted of two parts. First, a telephone survey was conducted to assess whether respondents supported and would participate in the market for environmentally

¹ Bootstrapping is a general technique for empirical estimation of sample distributions (Efron and Tibshirani). The method is particularly useful for computing confidence intervals and making tests of significance where sample sizes are relatively small, as in the pretest portion of this study. Bootstrapping involves drawing B samples of size n , with replacement, from the original data. The mean is calculated for each of the B samples, so that one eventually ends up with a $B \times 1$ vector of bootstrapped estimates of the sample means. By ordering the estimates from lowest to highest, one obtains an empirical distribution of the mean. If, say, $B=1000$, one estimates a 95% confidence interval using the 26th and 975th values in the list (*i.e.*, dropping the bottom and top 2.5% of the distribution).

² The prices and pictures were for actual local area products.

certified hardwood products by paying a premium. For the second part of the survey, an information booklet regarding certification of hardwood products was sent to those responding that they would be willing to pay a premium and indicated a willingness to further participate in the study. A follow-up phone call was used to collect information from these respondents regarding their willingness to buy a certified oak shelving board at a specified premium. The survey procedures followed recommendations in Dillman (1978).

Residents in six Tennessee counties were surveyed (Davidson, Hamilton, Hardeman, Knox, McNairy, and Wayne). The counties were chosen on the basis of their levels of hardwood removals and population densities. Three counties were selected that had high hardwood removal levels and low population density. Three counties were selected that had low hardwood removals and high population density. The purpose of dividing the sample was to examine how differences in urbanization and the importance of timber harvesting to an area might influence consumers' perceptions and willingness to pay. In each case, the urban counties had population densities of greater than 500 people per square mile, and hardwood removals of less than 2 million cubic feet per year. The rural counties had population densities of less than 75 persons per square mile (Census Bureau), and hardwood removals of 10 million cubic feet per year or greater (Timber Product Output (TPO) Database Retrieval System). Based on these criteria, the following counties were selected

Urban County/Low
Hardwood Removals

Davidson, Hamilton, Knox

Rural County/High
Hardwood Removals

Hardeman, McNairy, Wayne

Of the 803 residents surveyed, 400 lived in the rural counties and 403 lived in the urban counties.

Methods of Analysis

A logit model was used to evaluate how certification scope, demographics, attitudes toward the environment, and location may influence market participation for environmentally certified hardwood products (*Participate*). This logit model identifies who is most likely to be in the market for certified hardwood products. Logit models were then used to estimate conditional WTP for a certified oak shelving board (*PayShelf*) and a certified oak chair (*PayChair*). The conditional willingness to pay provides an estimate of how much the respondents are willing to pay for the certified product, given that they are a participant in the market for certified hardwood products (willing to pay some positive amount).

The variable representing whether the respondents are willing to participate in the market for environmentally certified hardwood products by paying some premium was expressed as *Participate*=1 if the respondent was willing to pay a nonzero premium for certified hardwood products, 0 otherwise. The variable representing whether the respondent would be willing to purchase the certified product at a specified premium was expressed as 1 if the respondent was willing to purchase the certified product at the specified premium, 0 otherwise. Using the example of a certified shelving board, the possible outcomes and their probabilities can be expressed as follows:

Equation 1a. –1c.

$$a. \Pr(\textit{Participate} = 1) = \Phi(\alpha + \hat{\alpha}X)$$

$$b. \Pr(\textit{PayShelf} = 1 | \textit{Participate} = 1) = \Phi(\mathbf{d} + \mathbf{g}Z + \mathbf{j}R)$$

$$c. \Pr(\textit{PayChair} = 1 | \textit{Participate} = 1) = \Phi(\mathbf{d} + \mathbf{g}Z + \mathbf{j}R)$$

where α , β , δ , γ , and ϕ are parameters to be estimated, and Φ is the logistic distribution (Greene, 2000). The matrices *X* and *Z* include demographics and several other factors (See Table 3). In

addition to the other explanatory variables used in the model described above, a premium variable, R , is included in the estimated equations for *PayShelf* and *PayChair*. While the magnitudes on coefficients from each logit model cannot be interpreted directly, the sign of each coefficient can.

Table 3. Variable Names and Definitions

Variable Names	Definitions
Model for Market Participation:	
<i>Participate</i>	1 if consumer is willing to pay a nonzero premium for certified hardwood products, 0 otherwise
<i>X Variables:</i>	
<i>Full</i>	1 if full certification, 0 otherwise
<i>Homeowner</i>	1 if home or condo owner, 0 otherwise
<i>Male</i>	1 if male, 0 otherwise
<i>Urban</i>	1 if urban area, 0 otherwise
<i>Age</i>	Age of respondent in years
<i>Conserve</i>	1 if contributed time or money to conservation organization, 0 otherwise
<i>Hunting</i>	1 if contributed time or money to hunting organization, 0 otherwise
<i>Forestuser</i>	1 if use forests for recreation purposes at least once per month or more, 0 otherwise
Models for Willingness to Buy Chair or Shelf at Specified Premium:	
<i>PayShelf</i>	1 if are willing to pay the specified premium for the oak shelving board, 0 otherwise
<i>PayChair</i>	1 if are willing to pay the specified premium for the oak chair, 0 otherwise
<i>Z Variables:</i>	
<i>Full</i>	1 if full certification, 0 otherwise
<i>Inc2</i>	1 if \$25,000 household income < \$35,000, 0 otherwise
<i>Inc3</i>	1 if \$35,000 household income < \$50,000, 0 otherwise
<i>Inc4</i>	1 if \$50,000 household income < \$75,000, 0 otherwise
<i>Inc5</i>	1 if \$75,000 household income
<i>R</i>	Premium on environmentally certified product (if oak shelving board, R =\$1.50, \$4.00, \$5.00, \$6.00, \$10.00, if oak chair, R =\$10.00, \$15.00, \$20.00, \$25.00, \$40.00)

The significance of the overall model is evaluated with a chi-square likelihood ratio test (LLR).³

The significance of the coefficients is evaluated with t-tests. The estimate of the conditional willingness to pay for the certified shelf or chair can be obtained by the following:

Equation 2

$$(WTP | WTP > 0) = (d + gZ) / -j$$

where the parameters δ , γ , and ϕ are estimated via Equation 1b. The value of willingness to pay for the product in Equation 2 is a conditional WTP estimate, because it is conditional on the respondent indicating willingness to participate in the market for certified products. An unconditional willingness to pay can be estimated by taking a probability-weighted sum of the two outcomes,

Equation 3

$$\{P(\text{Participate} = 0) \times 0\} + \{P(\text{Participate} = 1) \times (WTP | WTP > 0)\}$$

where the probabilities may be taken from a simple calculation using the raw data (the percentage saying that they were or were not willing to participate in the market) or from the logit model in Equation 1a.

The “full” certification program was hypothesized to have a positive influence on both market participation and the willingness to pay the premium for the certified shelving board relative to the “partial” certification program. This was anticipated, because the potential positive environmental effects of the full certification program would be throughout the market channel versus only at growing and harvesting, as with the partial certification program.

³The Log-Likelihood Ratio Test (LLR) compares the log-likelihood function of the model if only the intercept was included with the log-likelihood of the model and is calculated as LLR (Restricted to Intercept)-LLR (Not Restricted).

Based on findings from previous studies, homeownership and urban were hypothesized to have positive influences on market participation. Also based on findings from previous studies, the respondent being male was hypothesized to have a negative influence and younger age was hypothesized to have a positive influence.

Contribution to conservation or hunting/fishing organizations and frequent use of forests for recreation were hypothesized to have a positive influence on market participation, because these measures may reflect values the respondents place on the environment and forest resources.

The premium amount was postulated to have a negative effect on willingness to buy the certified product, so as the premium level increases, the willingness to buy the product at the specified premium should decline. Income was postulated to have a positive influence on willingness to buy the certified product, because as incomes rise, consumers could afford to pay higher premiums.

A method for calculating the variance of a function of random variables (in this case, the willingness to pay estimate), is called the “delta method” (Greene, 2000). The variance of the conditional willingness to pay estimates is as follows:

Equation 4

$$Var(WTP) = (\partial WTP / \partial \Gamma)' Var(\Gamma) (\partial WTP / \partial \Gamma)'$$

where WTP is given by equation 2, the \tilde{A} parameters (random variables) are estimated according to the logit model of equation 1b, and $Var(\tilde{A})$ is the variance-covariance matrix of the model.

Results

A total of 689 responded to all questions needed to conduct the analysis of market participation. The estimated probit model for market participation, equation 1a., is presented in

Table 4. The model was significant overall as shown by the log-likelihood ratio statistic. The model correctly classified 62.5 percent of the observations. The coefficients on the intercept, *Urban*, *Homeowner*, *Age*, *Conserve*, and *Forestuser* were significantly different from zero, while the coefficients on *Full*, *Male*, and *Hunting* were not significantly different from zero. The variables *Urban*, *Age*, *Conserve*, and *Forestuser* carried positive signs. The sign of the coefficient on *Homeowner* was negative.

Table 4. Estimated Probit for Market Participation (*Participate*)^a

Variable	Estimated Coefficient
<i>Intercept</i>	-.57568 *** (.22056)
<i>Full</i>	-.05787 (.09795)
<i>Urban</i>	.18503 * (.10320)
<i>Male</i>	-.15672 (.10137)
<i>Homeowner</i>	-.29909 ** (.13426)
<i>Age</i>	.00951 *** (.00345)
<i>Conserve</i>	.43129 *** (.10454)
<i>Hunting</i>	-.16061 (.12200)
<i>Forestuser</i>	.29444 *** (.10979)
N	689
% Correct	62.5544
LLR	44.4886 ***

^a *indicates significance at the 90 percent confidence level, ** indicates significance at the 95 percent confidence level, and *** indicates significance at the 99 percent confidence level.

If profiles of market participation are formed based on the signs of the coefficients, then a profile of a market participant would be an urban dweller, not a homeowner, older, contributes to a conservation organization, and a frequent forest user. The profile of a market non-participant would be rural dweller, homeowner, younger, does not contribute to a conservation organization, and not a frequent forest user. For these profiles (and also including variables of like sign even if they are not significant), the respondent of profile 1 has a 73.25 percent chance of being a market participant, while the respondent of profile 2 only has a 23.69 percent chance of market participation. A summary of the characteristics by market participation is shown in Table 5.

Table 5. Characteristics of Respondents by Market Participation

Characteristic	Participate	Not Participate
<i>Urban</i>	.56536	.469974
<i>Male</i>	.48039	.556136
<i>Homeowner</i>	.78105	.843342
<i>Age</i>	49.0719	47.3969
<i>Conserve</i>	.45098	.281984
<i>Hunting</i>	.24183	.284595
<i>Forestuser</i>	.45098	.381201

The estimated probit models for willingness to purchase the certified shelving board and certified chair, equations 1b. and 1c. are displayed in Table 6. As indicated by the log-likelihood ratio statistics, the model for the shelving board was significant overall, while the model for the chair was not. The model for the shelving board correctly classified 74.27 percent of the observations. The model for the chair correctly classified 77.86 percent of the observations. The coefficient on *Full* was significant and carried a negative sign in the model for the shelving board. The coefficient on *Full* was not significant in the model for the chair. The coefficients on *Inc2* and *Inc3* were positive and significant in the model for the shelving board. The

coefficient on *Inc4* was positive and significant in the model for the chair. For both models, the coefficient on the premium, *R*, was significant and negative.

Table 6. Estimated Probit Model for Willingness to Purchase the Certified Shelving Board and Chair at the Specified Premiums^a

Variable	Estimated Coefficients	
	<i>PayShelf</i>	<i>PayChair</i>
<i>Intercept</i>	1.32971 *** (.34936)	1.16688 *** (.38176)
<i>Full</i>	-.67696 *** (.26187)	-.19572 (.26480)
<i>Inc2</i>	1.34264 ** (.55428)	.33138 (.41182)
<i>Inc3</i>	.70725 * (.40311)	.68321 (.43306)
<i>Inc4</i>	-.17710 (.35597)	.72152 * (.41431)
<i>Inc5</i>	-.14560 (.32427)	.21007 (.34302)
<i>R</i>	-.10402 ** (.04391)	-.02589 ** (.01243)
<i>N</i>	134	131
<i>% Correct</i>	74.2690	77.8626
<i>LLR</i>	23.3526	8.8319

^a * indicates significance at the 90 percent confidence level, ** indicates significance at the 95 percent confidence level, and *** indicates significance at the 99 percent confidence level.

If the estimated coefficients from Table 6 are used along with equation 2, the conditional willingness to pay can be calculated. The conditional willingness to pay for the shelving board was \$11.72 and the conditional willingness to pay for the chair was \$55.18. The delta method (Equation 4) was used to calculate the estimated standard errors. The standard error on the estimate of WTP for the chair was \$16.34, and the standard error on the estimate of WTP for the shelving board was \$2.95. The unconditional estimates of WTP are found using equation 3. The unconditional WTP for the shelving board was \$5.20 and the unconditional WTP for the chair was \$24.50.

If the estimated coefficients from Table 6 are used with the sample means, except the premium level, and the premium level is varied, the effects on the probability of willingness to pay the specified premium given varying premiums can be projected. These results are shown in Table 7. As can be seen, as the premium level rises, the probability of being willing to pay the premium falls. The unconditional probabilities are also shown. These are found by multiplying equation 1a. (probability of market participation) by equation 1b. (probability of paying the premium for the shelf) or 1c (probability of paying the premium for the chair).

Table 7. Premiums for Certified Products and Probability of Willingness to Pay

		Probability of Willingness to Pay, by Premium Level				
		<u>Shelving Board</u>				
		\$1.50	\$4	\$5	\$6	\$10
Conditional		.8562	.7891	.7578	.7241	.5711
Unconditional		.3802	.3504	.3365	.3216	.2536
		<u>Chair</u>				
		\$10	\$15	\$20	\$25	\$40
Conditional		.8790	.8509	.8188	.7827	.6529
Unconditional		.3904	.3779	.3636	.3476	.2899

Conclusions

The results from this study suggest a market participation rate of about 44 percent for certified hardwood products. This percentage is much lower than findings from several prior studies that ranged as high as 60 to 80 percent for projected market participation. One possible explanation for this lower estimate of market participation may be that respondents were allowed to express their support for environmental certification without paying a premium. This may have helped diminish yea-saying bias.

The market participant profile included urban, non-homeowners, older in age, contributors to conservation organizations and frequent forest users. Consumers of this profile

had over an 70 percent chance of being market participants and constitute a potentially important market segment for certified hardwood products.

The willingness to buy a certified product over an uncertified one is responsive to the premium level. The average conditional WTP for an oak shelving board was 40.7 percent, while the unconditional WTP was 18.0 percent. The average conditional WTP for the chair was 27.7 percent and the unconditional WTP for the chair was 12.3 percent. As was expected, the percent premiums for the more expensive item were lower. The percent premiums of the unconditional WTP for the products are similar to findings from previous studies.

The scope of the certification did not appear to have a consistent influence on market participation or the willingness to pay. The negative sign on scope in the shelving board model was unexpected. This result is surprising, because if the scope of the certification is broader, representing greater potential benefits to the environment, it would be expected that consumers would place a greater value on the certified product. This finding points to several possibilities. First, it could reflect consumers' doubts about the ability to monitor environmental management practices throughout the market channel for wood products compared with timber growing and harvesting only. Second, it could reflect that consumers place the greatest value on environmental management practices at the timber growing and harvesting level of the market channel rather than beyond that level in the market channel. Finally, it could point to the importance of effective education programs regarding certification programs that outline how monitoring is performed at each stage of the market channel and the potential benefits accruing to the environment.

References

- Blamey, R., J. Bennett, and M. Morrison. 1999. "Yea-saying in Contingent Valuation Surveys." *Land Econ.* 75: 126-141.
- Cabarle, B., J. Cashwell, M. Coulumbe, J. Mater, W. Stuart, D. Winthalter, and L. Hill. 1995. "Forest Certification." *J. For.* 93(4):6-10.
- Carter, D. and F. Merry. 1998. "The Nature and Status of Certification in the United States." *For. Prod. J.* 48(2):23-28.
- Cummings, R. and L. Taylor. 1999. "Unbiased Value Estimates for Environmental Goods: A Cheap Talk Design for the Contingent Valuation Method." *Amer. Econ. Rev.* 89(3):649-665.
- Dillman, D. 1978. *Mail and Telephone Surveys: The Total Design Method*. John Wiley and Sons, New York. 325 p.
- Effron, B. and R. Tibshirani. *An Introduction to the Bootstrap*. New York: Chapman and Hall, 1993.
- Forsyth, K., D. Haley, and R. Kozak. 1999. "Will Consumers Pay More for Certified Wood Products?" *J. For.* 99(2):18-22.
- Greene, W. 2000. *Econometric Analysis, 4th Edition*. MacMillan Publishing Company, New York. 791 p.
- Grönroos, J. and J. Bowyer. 1999. "Assessment of the Market Potential for Environmentally Certified Wood Products in New Homes in Minneapolis/St. Paul and Chicago." *For. Prod. J.* 49(6):28-34.
- Kotchen, M. and S. Reiling. 1999. "Do Reminders of Substitutes and Budget Constraints Influence Contingent Valuation Estimates? Another comment." *Land Econ.* 75:478-482.
- Ozanne, L. and P. Smith. 1998. "Segmenting the Market for Environmentally Certified Wood Products." *For. Sci.* 44(2):379-389.
- Ozanne, L. and R. Vlosky. 1997. "Willingness to Pay for Environmentally Certified Wood Products: a Consumer Perspective." *For. Prod. J.* 47(6):39-48.
- Rametsteiner, E., P. Schwarzbauer, H. Juslin, J. Karna. R. Cooper. J. Samuel, M. Becker, and T. Kuhn. 1999. "Consumer survey results." P. 11-13 in *European Forest Institute conference Proc., Discussion Paper 2, on Potential markets for certified forest products in Europe*. European Forest Institute, Joensuu, Finland.

Spinazze, M. and S. Kant. 1999. "Market Potential for Certified Forest (Wood) Products in Ontario, Canada." *For. Chron.* 75(1):39-47.

US Census Bureau. *County Population Estimates as of July 1, 1999.* <http://www.census.gov>.

USDA For. Serv. *Timber Product Output Database Retrieval System as of 1996.*
<http://srsfia.usfs.msstate.edu/rpa/tpo/>

Welch, T. 1998. *Moving Beyond Environmental Compliance: A Handbook for Integration Pollution Prevention with ISO 14000.* Lewis Publishers, Boca Raton. 240 p.

Winterhalter, D. and D. Cassens. 1993. "Telling the Sustainable Forest from the Trees."
Furniture Design and Manufacturing. 65(8):101-106