

C I N T R A F O R

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An Analysis of Sale Characteristics on the Timber Sale Value 1989 - 2005

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Executive Summary

The Washington State Department of Natural Resources (DNR) manages 2.1 million acres of timberland. Timber harvested from these lands has averaged 12 percent of Washington's total annual timber harvest level from 1989 through 2003. Management plans have incorporated more ecosystems goals such as promoting ecosystem health, habitat conservation, and increasing the structural complexity of the timberland. The management plan adhered to by the DNR will likely result in more heterogeneous stands of timber and thus timber sales of more heterogeneous saw timber.

The goal of the study was to examine how the diversity of saw timber in a given timber sale impacted the final sale value in lump sum sales of western Washington. Saw timber diversity was defined by the distribution of volume among different species and saw log grades in a given sale. Prior research predominately located in the U.S. South had shown a reduction in timber sale value as sales included a greater level of saw timber diversity. This result is based on the theory that increasing transaction costs associated with the processing of more heterogeneous stands led to a less desirable timber sale characteristic per sale. These processing costs include harvesting, sorting and the reselling of undesirable timber.

The study focused on lump sum state timber sales in western Washington. Lump sum sales require prospective buyers to bid on the right to harvest an entire timber sale. A parcel is first advertised and then auctioned as one unit, establishing a fixed payment for the timber sale by the winning bidder. Since this method of sale requires the buyer to purchase and harvest all timber advertised in a sale, it can result in forcing buyers to purchase timber species and saw log grades that they have little or no interest in. This rationale led to the hypothesis that a negative relationship would be observed between increasing saw timber diversity and the final sale value of lump sum timber sales in the data. The detailed inventory information provided by the DNR enabled the calculation of an index value for saw timber diversity that could be used as a metric in empirical examination of the relationship between diversity and the final sale value.

A diversity variable was created to facilitate examination of the impact increased heterogeneity of saw timber in a tract has on the final sale value of lump sum timber sales. This required the calculation of a diversity variable that would account for the species and grade characteristics of each individual timber sale. To this end the Shannon-Wiener index was selected as the best method for calculating this variable. It was an appropriate choice for this data because it could be calculated using the detailed inventory information. In this research stand diversity or heterogeneity applied only to the species of trees and log grades that were included in the timber sale data. Wildlife and other facets of a timber stand were not included in the calculation of the diversity index.

The diversity index created had a range of 0 for a completely homogeneous timber sale to 3.689 for a completely heterogeneous timber sale. Slightly less than 800 sales had values from 1.4 and 1.7. Another 700 sales included values from 0.7 and 1.3. About 500 sales had values from 1.8 to 2.2. The remaining sales were distributed above and below these ranges. A total of 2194 sales were included in the study.

Other variables examined in the model to explain the final sold value of the timber sale included the total number of bidders on a timber sale, the total acreage of the timber sale, the contract length of the timber sale, the total number of miles of required road reconstruction, the Douglas fir volume of the saw log grades P, 2P, 3P, SM, 1S, the Douglas fir volume of the saw log grade 2S, the Douglas fir volume of the saw log grade 3S, the Western Hemlock volume of the saw log grades P, 2P, 3P, SM, 1S, the Western Hemlock volume of the saw log grade 2S,

the Western Hemlock volume of the saw log grade 3S, all other volume included in the timber sale, and the WWPA lumber index price of Douglas fir. During the process of model fitting a diversity measure of the timber sale accounting for only the distribution among eight possible tree species and a diversity measure of the timber sale accounting for only the distribution among the five possible saw log grades were used in alternative model comparisons.

The final sold value of a timber sale in U.S. dollars represented the winning bid of a timber sale. By including the volume found in the three highest grades of both dominant and co-dominant species, as well as the other sale volume on the right hand side of the equation, the problem of scale with respect to the dependant variable was alleviated. In other words, the existence of large bid values skewing estimates simply due to large volumes was eliminated.

Seven models were estimated with alternative sets of independent variables. There was consistent evidence that the final value of DNR timber sales located in western Washington were negatively influenced by increases in the level of saw timber heterogeneity over the period of study. Heterogeneity among tree species was found to impact final sale value more than heterogeneity among saw log grades. A possible reason for this result is that commodity producers generally focus on a tree species or a certain range of grade classes. For instance a sawmill may be best geared to mill #2 and #3 saw logs, or perhaps a commodity producer uses only Douglas fir in the manufacture of its products. Increasing heterogeneity of saw timber in a lump sum framework forces these bidders to bid on greater volumes that they are not interested in and may in fact have to resell. This is believed to be viewed negatively by bidders as an additional cost of doing business. Alternative theories are likely to exist as well that can increase the cost of harvesting and marketing logs.

The impacts of saw timber heterogeneity are not well serviced by the lump sum method of timber sale. Timber sales in which greater levels of saw timber diversity are observed may return greater revenues to the DNR if another method of sale is instituted. Additional empirical work on heterogeneous timber sales focusing on how the DNR can create bundles of timber from these sales attractive to different bidders would be pertinent.

In addition to the effect of saw timber diversity, this study found significant evidence that an increased pool of bidders and therefore increased competition for a timber sale had a positive impact on the market value. However, the data indicates that the level of competitiveness declined over the period of study. The existence of a competitive framework among bidding firms is a key to achieving a final timber sale value at or near its true market value. Declines in the average number of bidders on timber sales in the data set may be caused by a number of factors. Regardless, these declines may be cause for concern and further research into why they are occurring and what can be done to alleviate the impacts would be relevant.

The total acreage of timber sales in the study region displayed diseconomies of scale. While this result was not predicted, it is not uncommon in the literature. Munn and Rucker (1995) and Boltz et al. (2002) both found significant evidence that parcel size negatively impacts final sale value. However, this variable presents a clear focus for future study to explore why increasing parcel size results in reduced final sale value in western Washington. In understanding the implications of this variable it is important to consider who purchases DNR timber and industry shifts over the period of study.

Research regarding how the DNR could increase the number of bids offered on its timber sales and alter its methods of sale would also be valuable. While increasing the competition among bidders is a good way of increasing the timber revenues annually generated by the DNR's timber sale program, mill consolidation in the state of Washington suggests that there may not be a lot of room for this to occur. Additionally, the DNR would not want to adversely impact business relationships it has developed with large commodity producers. They represent a steady demand for the states timber as well as important sources of employment. Future economic research is needed to determine the feasibility and impact of attempts to improve competitiveness and marketing of DNR timber sales.

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