

C I N T R A F O R

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An Economic Assessment of the Lumber Manufacturing Sector in Western Washington

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Executive Summary

Lumber manufacturing remains an economically important industry in the State of Washington. The sector has added value to Washington's timberlands and continues to generate the majority of regional timber demand. Lumber production contributes to rural economic development and employment. Lumber manufacturing has remained particularly viable in western Washington, despite macroeconomic uncertainty, regulatory constraint, and competition from foreign and other domestic producers. The last economic assessment of the western Washington lumber industry was performed in 1991 (Stevens).

This study applied classical economic techniques to provide insight into how lumber manufacturers in western Washington responded to market conditions from 1972 to 2002. Lumber manufacturing activities were investigated using a three-input Cobb-Douglas and a transcendental logarithmic (translog) cost function. Analyses were performed using a panel data set with biennial time series observations from 1972 to 2002 for sixteen western Washington counties. The measures used to assess economic performance were economies of scale, Allen and Morishima partial elasticities of substitution, own- and cross-price factor demand elasticities, and technical change. These measures were investigated at regional, biennial, and county level scales.

This study shows the western Washington lumber manufacturing sector can be modeled with nonconstant returns to scale, nonunitary elasticity of substitution, and biased technical change among the inputs capital, labor, and logs. Substantial substitution possibilities between factors of lumber production exist, and a fixed-proportion functional form like the Cobb-Douglas is inappropriate to model the lumber industry structure. The estimated translog cost function was well-behaved and an appropriate choice of functional form for the western Washington lumber industry.

Lumber production costs are most sensitive to the price of logs, followed by the price of labor and least impacted by the price of capital. Mean cost share values for logs, labor and capital are 58, 24 and 18 percent, respectively. At the regional level, sawmills have captured economies of scale in the production of lumber. A 10 percent increase in output resulted in a 0.418 percent reduction in costs. Economies of scale values jumped during the 1980s recession as firms produced radically less output and faced higher input costs; values subsequently declined as firms exhausted scale economies during times of harvest level reductions in the 1990s.

At the regional level, Allen and Morishima partial elasticities of substitution agreed that all inputs were inelastic substitutes with the greatest substitutability between capital and labor and least substitutability between logs and labor. Capital demand was the most own-price responsive and log demand the least. Cross-price demand elasticity was greatest between capital and labor; cross-price elasticities for all input combinations including logs were near zero. Demand for logs was highly inelastic with respect to own-price and the price of other inputs. This pattern was relatively consistent across time and across counties, although at finer scales greater evidence of complementary between inputs was noted.

Expansion of lumber production and capacity over time primarily occurred in Lewis, Pierce, Clallam, and Cowlitz Counties owing to new sawmill infrastructure. Gains in Cowlitz County were primarily made from investments in existing mills. Lewis gained one large mill in 1998, increasing the total number of large mills to seven, but additions in existing sawmills contributed to increase capacity. The number of large mills in

Pierce County remained constant from 1996 to 2002; capacity investments in existing mills led to increased lumber output. Although capacity in Snohomish County sawmills rose, the loss of three large mills between 1998 and 2002 caused an overall decline in lumber production. Results point to processing capacity centers developing in two areas, Clallam County on the Olympic Peninsula and counties along the I-5 corridor south of King County. Restructuring of log export markets, proximity to Interstate-5, and port access seem to be factors in industrial expansion, but the magnitude is unknown.

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