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Economic Implications of Forest Products Sector Industry Development in Northwest Louisiana

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Introduction

An innovative approach has been developed at the Louisiana Forest Products Laboratory to stimulate economic development and alleviate chronic long-term economic deterioration in rural resource-based regions (Vlosky et al., 1998). Targeting the secondary forest products industry as a driver for economic development, the methodology addresses a number of areas including markets for value-added products, industry labor skill requirements, training needs, sociological factors which affect or influence the labor market and potential economic outcomes based on various industry development scenarios.

The methodology incorporates a holistic approach that emphasizes long-term sustainable industry development. The goal is to develop the forest products industry while adding value to existing resources, creating employment opportunities with transferable skills and maintaining the stewardship of renewable resources in rural communities.

As is the case with most economic development efforts, forest sector strategies rely on either retention and expansion of existing companies or attracting new industrial investment. In addition, most industry development efforts focus on value-added secondary processing (dimension products, furniture, flooring) rather than primary production (lumber and plywood) to retain and expand jobs in rural areas. Value-added secondary wood processing offers opportunities for increased profitability through higher margins and greater profits. Employment is encouraged with larger numbers of smaller local companies instead of a few large primary-processing plants. In addition, higher economic multipliers are realized in secondary manufacturing compared to primary conversion (Syme and Duke 1991).

Making secondary wood products often offers opportunities that primary processing does not normally offer. For example, secondary manufacturers can generally increase prices to make up for lost profits when raw material costs rise. Secondary products also earn higher profits by adding value and meeting specific customer needs. Secondary products also can lead to better resource use. Making specialty products instead of commodities allows a company to take better advantage of new markets.

Secondary processing also allows a producer to respond quickly to new trends, such as home remodeling-repair markets (Syme and Duke 1991).

In locales where jobs are in short supply, locally generated secondary forest products industry jobs that create transferable skills may offer a viable alternative to forced migration to maintain or increase employment (Skog 1991). Further, secondary forest products wages often exceed average wages of other jobs in rural areas, adding incentives for recruitment and development efforts aimed at secondary forest products industry companies (Skog 1991).

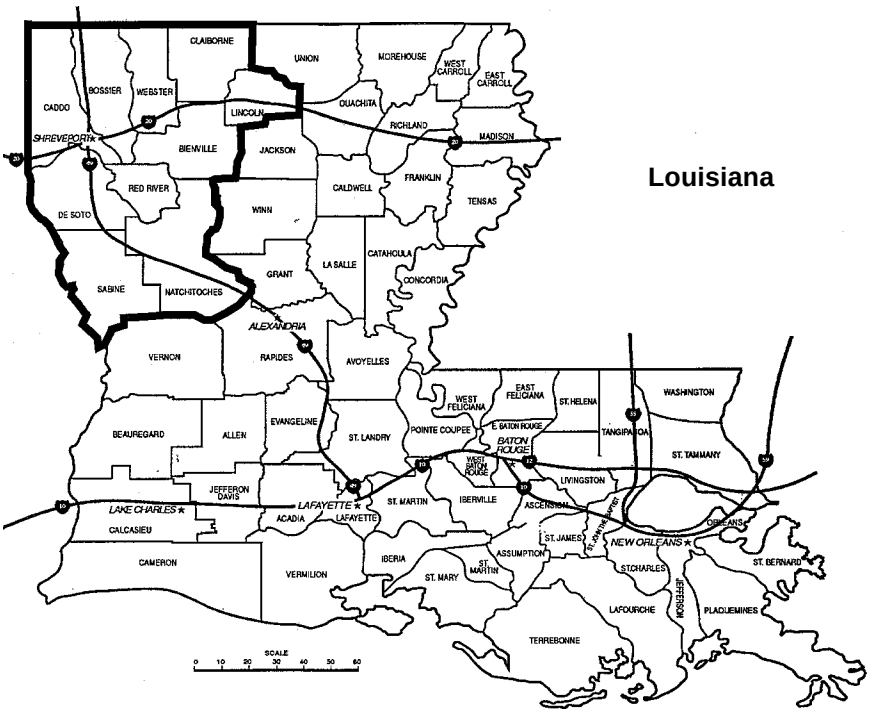
Many states and regions in the United States are diversifying rural economic opportunities through forest resource based industry sector development. Kentucky, Maine, Oregon, Pennsylvania and Washington are examples of states taking advantage of forest resources to improve economic conditions within their borders (Jones et al., 1989). In this study, industry development opportunities specific to northwest Louisiana were examined. This publication focuses on the economic impacts of forest products industry development in this region.

The Problem

In the forest products industry, Louisiana produces only $.97 of value-added product for every $1.00 of lumber created by the sawmills operating in the state. This compares to the southern average of $2.13 of value-added for $1.00 of sawmill product produced. Improvement of industry competitiveness can increase potential for jobs creation and resource use in the rural-based forest products industry. To attain this potential, a wide variety of issues must be addressed. For example, existing consumer market trends, location decision criteria, raw materials availability and applicability, labor force skills and training requirements, target market identification, recruitment and retention strategies, comparative advantages and effects on community stability should all be considered as part of an economic development initiative.

The “Study Region” parishes included in this study are Bienville, Bossier, Caddo, Claiborne, DeSoto, Lincoln, Natchitoches, Red River, Sabine and Webster. (Figure 1). The area is chronically lagging the rest of the country with regards to employment and other economic indicators. In addition, forest resource depletion is exceeding sustainable levels for some key species. All parishes in the contiguous 10-parish region conform to Long-Term Economically Depressed (LTED) eligibility as defined by the U.S. Department of Commerce, Economic Development Administration.

Figure 1. Study Region



Project Objectives

Specific project objectives are to:

1. Conduct a regional forest resources assessment as an indication of raw material supplies.
2. Identify the existing industry structure.
3. Analyze sources of competitive advantage for the region's secondary forest products manufacturing base and identify broad sectors with high growth and market potential.
4. Determine social and economic profiles for the study region.
5. Describe the pool of eligible workers in the area to support industry development.
6. Identify labor skill needs of the value-added secondary forest products industry.
7. Estimate economic impacts resulting from various forest based industry development scenarios.
8. Generate information that can assist policymakers in formulating strategies for implementation of rural economic development efforts designed to capitalize on defensible market-driven opportunities in forest products industry sectors.

Classifying Solid Wood Products

Solid wood (as opposed to pulp and paper products) forest products can be broadly characterized as primary or secondary products. This classification is not always clear, but most industry observers agree on general definitions of the groups:

Primary products are those produced directly from raw timber input. Examples include chips, lumber, veneer, plywood and their by-products.

Secondary products use primary products as input for remanufacturing. Examples include various types of panels, engineered composites or dimension stock. Secondary products also

can include final consumer products such as furniture. This study focuses on the secondary, or value-added, sector of the industry.

The value-added forest products industry has the potential for facilitating economic growth in Louisiana. The industry is growing, local supplies of raw material inputs are readily available and large viable output markets exist in Louisiana and in the nearby Dallas-Fort Worth metropolitan area. Development of the forest products sector is especially important, because economic activity in many traditional export base industries, such as mining and row crop agriculture, continue to decline in several areas.

This research focuses on estimating the impacts of feasible growth in the value-added forest products industry on the economy of a 10-parish region in northwest Louisiana. Emphasis is on examining the distributional consequences of this growth. The expectation is to provide policymakers with an idea of the sector's possible contribution to total economic activity and to income distribution in the region.

Overview of Forest Products Sector Economic Development

The contribution of the entire forest products sector to economic development, especially in rural areas, is becoming increasingly recognized (Wear and Hyde 1991). This recognition is part of the shift in the focus of federal land management policy to include broader concerns in addition to maximum sustainable wood harvest levels. Besides concerns that relate to economic development, such as income distribution and community stability, federal land management policy also has become concerned with environmental, often nonmarket, effects of land use decisions.

A significant element in the shift has been changes in land management brought about by the endangered species act (Sample and Le Master 1992). A major concern has been the effect of resulting possible and actual reductions in wood harvest levels at the industry and regional economy levels.

Estimates of job losses at the regional levels as a result of species listing have varied widely. For example, estimated job loss caused by the listing of the Northern Spotted Owl in all forested areas in western Washington, western Oregon and northern California have ranged from 12,000 jobs (Anderson and Olson 1991) to 100,000 jobs (Beuter 1990). Estimates of employment impacts have varied widely because of differences in assumptions about the pace of mill modernization (ongoing substitution of capital for labor) and about alternative employment opportunities in the region for displaced workers (Sample and Le Master).

A question that arises in studying the effects of this and other policies is the impact, not only on growth in the regional economy, but also on broader issues of economic development. Economic development can be defined in several different ways. Most of the literature on the subject emphasizes the complexity of the process including possible impacts on types of jobs created and income distribution as well as on the narrower issue of levels of growth (Todaro 1994). Wear and Hyde (1992) emphasize this point in calling for research that will result in estimates of the distributional consequences of policy actions and industry growth or decline in the forest products industry.

In response, a small but growing body of recent literature is starting to examine the distributional impacts of forest land management. Stevens (1995) used a profit function method to examine the impact of changes in timber stumpage prices on skilled versus unskilled labor in the Washington sawmill industry. He concluded that any increase in stumpage prices would have a larger detrimental effect on unskilled, rather than skilled, workers. Marcouiller et al. (1995) used a social accounting matrix (SAM) to examine the effects of increased timber production on the distribution of income in McCurtain County, Oklahoma. Effects transmitted through timber ownership were shown to have no effect on household income, and increased wood processing was shown to contribute positively to income levels for poorer households. Binkley et al. (1994) assessed the impact of reduced forest harvest levels in British Columbia on the provincial economy with a Computable General Equilibrium (CGE) model. In assessing the impact, they argued that many communities in the province had few alternative development options.

No studies to date have examined the contribution of value-added forest products industries, such as furniture manufacturers, to regional economic development. Rather, previous research on the economic contribution of these industries has centered on either product marketing channels (Meyer et al., 1992; Chance and Vlosky 1996; Vlosky, Chance and Doucet 1996; and Vlosky et al., 1997) or on comparing direct value-added by industry components (Irland and Maxcy 1991). A few economic impact studies, such as Aruna et al. (1997), have examined the contribution of the forest products industry to regional economic activity, but only at a very aggregated level. Further, these studies have not examined the impact of the value-added forest products industry on income distribution in a particular economy or set of economies.

This research is designed to fill a gap in the literature by providing an assessment of the value-added forest products industry's contribution to total economic activity in a regional economy. The research also is intended to provide an examination of how feasible growth in the industry would influence the distribution or regional income between different types of households.

Data and Methods

Interindustry models are a well-established procedure for examining the effects of the development of a particular industry on a regional economy. This set of models includes the more traditional input-output (I-O) model, the social accounting matrix (SAM) (Adelman and Robinson 1986) and the price flexible Computable General Equilibrium (CGE) model (Berck et al., 1990). In the SAM, the I-O framework is extended by explicitly modeling relationships involving nonmarket income flows, such as government transfer payments to households. In a regional SAM, the flow of income from industries in the region to regional households (as providers of factors of production) is explicitly outlined (Holland and Wyeth 1993). Historically, SAMs have been constructed along either income class or functional lines to allow for examining changes in income distribution under various scenarios.

The model used in this study is a SAM of the 10-parish (county) region in northwest Louisiana. The 10 contiguous parishes included are: Bienville, Bossier, Caddo, Claiborne, DeSoto, Lincoln, Natchitoches, Red River, Sabine and Webster. The SAM was generated based on the IMPLAN (IMpact PLANning) regional model construction software (Minnesota IMPLAN Group, Inc., 1996). IMPLAN can be used to create so-called ready-made economic models (originally I-O and more recently SAM) of regional economies.

Adapting ready-made models to a variety of uses has given rise to a group of models known as hybrids. Hybrid models are I-O or SAM models that have been constructed for a specific purpose or economy by adapting a ready-made model. Such adaptations are the result of efforts on the part of users to validate the model for a specific locale or use. Many different procedures are employed in the validation process, ranging from the use of secondary and primary data sources to statistical procedures. The significance of these validation processes is particularly sensitive to the level of sector aggregation employed in the model and the economic structure of the economy being modeled. These factors are particularly important to those concerned with substate or rural economies, since all of the ready-made modeling systems draw on nationally developed coefficients in some manner.

The SAM used in this study was a hybrid model based on the original ready-made (IMPLAN) SAM for the 10-parish region in northwest Louisiana. The original SAM was modified in several respects to generate the hybrid SAM used in this study.

In IMPLAN, the production and consumption of up to 528 industries in an economy can be accounted for. According to the IMPLAN database, 290 industries existed in the 10-parish regional economy in 1993. For regional economic models, it is common practice to aggregate (group together) individual industries based on the economy under study and the goals of the research. Hence, the original IMPLAN SAM was aggregated into a 17-industry model.

According to the IMPLAN database, value-added forest products industries at the four digit Standard Industrial Classification (SIC) Code level that existed in the region included Millwork (SIC 2431), Wood kitchen cabinets (SIC 2434), Structural wood members n.e.c. (SIC 2439), Wood pallets and skids (2448), Wood preserving (SIC 2491), Wood products n.e.c. (SIC 2499), Wood household and upholstered household furniture (SIC 2511, SIC 2512), Wood television and radio cabinets (SIC 2517), Public building and related furniture (SIC 2531), and Wood partitions and fixtures (SIC 2541). Because production levels in the region were modest, the 11 industries were aggregated into five industries that were used to represent the value-added forest products industry in northwest Louisiana. The five sectors were Kitchen Cabinets and Millwork (IMPLAN sector 137), Structural Wood Members (including wood pallets and skids) (140), Wood Preserving (including wood products n.e.c.) (145), Furniture (wood household, upholstered household, and public building furniture and wood television and radio cabinets) (148) and Wood Partitions (157).

Twelve other sectors were used to represent the rest of the regional economy. Nine of the 12 industries were formed from 276 of the remaining 279, producing sectors in the original IMPLAN model of the regional economy. Because of expected strong backward linkages from the value-added forest products industries, three industries, Logging (133), Sawmills (134) and Veneer and Plywood (139), were kept as individual industries.

Another set of changes in the model concerned Regional Purchase Coefficients (RPCs) that are estimates of use by regional industries of regional production of a given commodity (Minnesota IMPLAN Group, Inc., 1997). For example, an RPC of 0.8 for logging indicates that firms located in the region would purchase 80 percent of all logs produced in the regions. Estimating RPCs is important, because RPC levels influence estimates of regional economic multipliers and economic impact analysis. Original RPC estimates are provided in the IMPLAN software. These coefficients are estimated based on economic theory, but can be changed by individuals with superior knowledge and data concerning a regional economy (Minnesota IMPLAN Group, Inc., 1997).

RPC coefficients for 34 commodities in the original SAM model were modified to improve the accuracy of model estimates (Table 1).[1] For 24 commodities, RPCs were changed based on knowledge of the regional economy and on economic theory. For example, the RPC for ready-mixed Concrete (IMPLAN commodity 244) was increased from .0062 to 1.0, because location theory indicates that such a bulk item is prohibitively expensive to ship long distances and hence the commodity would serve local markets.[2] RPCs for 10 forest products industries were changed based on survey data provided in another part of this report. Primary forest products and value-added forest products firms in the region were asked separately about the geographical distribution of their sales (in Louisiana, out of Louisiana and out of the United States). Their responses provided an upper boundary on the regional RPC for the commodities in question. For example, if a firm ships 60 percent of its production out of state, then the upper boundary on the regional RPC for the commodity would be 40 percent.

Based on this information, the RPCs for three primary forest products industries (Sawmills (commodity 134), Veneer and Plywood (139) and Reconstituted Woods Products (146)) were all changed from larger values to 0.1433. The RPCs for seven value-added forest products commodities (Wood Kitchen Cabinets (138), Structural Wood Members n.e.c. (140), Wood Pallets and Skids (142), Wood Preserving (145), Wood Products n.e.c. (147), Wood Household Furniture (148) and Wood Partitions and Fixtures (157)) were all changed from larger values to 0.3297.

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[1] RPCs are for commodities rather than industries because an industry can produce multiple outputs (commodities). Firms are classified based on their primary (largest dollar value) industry. In an industry by industry SAM, as used here, matrix multiplication is used to include information about the relationship between industries and commodities in the appropriate model coefficients.

[2] RPCs for all nonservice commodities in IMPLAN (commodities 1 through 445) are estimated through an econometrically based procedure using national data. RPC estimates for IMPLAN service commodities (commodities 446 through 528) are calculated on the basis of observed 1977 values for state supply, exports and imports. Because the IMPLAN RPC estimates are designed to apply to a wide variety of commodities and are driven by national values, large changes in coefficients are justified for certain commodities.

Table 1. Modified Regional Purchase Coefficients in the Social Accounting Matrix (SAM) of the Northwest Louisiana Economy in 1993.

Commodity Code	Commodity Name	New RPC	Original RPC	Difference
1	Dairy Farm Products	0.7000	0.0409	0.6591
2	Poultry and Eggs	0.9000	0.9827	-0.0827
10	Cotton	1.0000	0.1024	0.8976
13	Hay and Pasture	1.0000	0.0696	0.9304
23	Greenhouse and Nursery Products	0.3174	0.1001	0.2173
60	Poultry Processing	0.1000	0.9503	-0.8503
95	Bottled and Canned Soft Drinks and Water	0.8250	0.0193	0.8057
101	Manufactured Ice	1.0000	0.8263	0.1737
134	Sawmills and Planing Mills, General	0.1433	0.7839	-0.6406
138	Wood Kitchen Cabinets	0.3297	0.5337	-0.2040
139	Veneer and Plywood	0.1433	0.8603	-0.7170
140	Structural Wood Members, n.e.c.	0.3297	0.8016	-0.4719
142	Wood Pallets and Skids	0.3297	0.8106	-0.4809
145	Wood Preserving	0.3297	0.9498	-0.6201
146	Reconstituted Wood Products	0.1433	0.8114	-0.6681
147	Wood Products, n.e.c.	0.3297	0.4067	-0.0770
148	Wood Household Furniture	0.3297	0.4622	-0.1325
157	Wood Partitions and Fixtures	0.3297	0.8174	-0.4877
162	Paper Mills	0.0300	0.0030	0.0270
163	Paperboard Mills	0.0500	0.0054	0.0446
164	Paperboard Containers and Boxes	0.2000	0.9921	-0.7921
174	Newspapers	0.6000	0.1870	0.4130
179	Commercial Printing	0.5000	0.1728	0.3272
195	Drugs	0.2000	0.6269	-0.4269
243	Concrete Products, n.e.c.	0.2500	0.0159	0.2341
244	Ready-mixed Concrete	1.0000	0.0062	0.9938
284	Fabricated Plate Work	0.2000	0.0363	0.1637
433	Railroads and Related Services	1.0000	0.5594	0.4406
460	Insurance Agents and Brokers	0.9000	0.5223	0.3777
461	Owner-occupied Dwellings	1.0000	0.7000	0.3000
463	Hotels and Lodging Places	0.3000	0.6619	-0.3619
494	Legal Services	0.7000	0.7764	-0.0764
504	Labor and Civic Organizations	0.8000	0.5996	0.2004
513	U.S. Postal Service	1.0000	0.5112	0.4888

Another important change that was made to the original IMPLAN SAM for the regional economy was the way in which earnings are accounted for. Earnings are payments to labor (employee compensation in IMPLAN) and payments to owner-operators (proprietors' income in IMPLAN, a mixture of returns to capital and labor). In terms of consumption of regional income and aggregate nonmarket income flows, households are divided into three income groups of low income households (up to $20,000 in annual income), medium income households (between $20,000 and $40,000 in annual income) and high income households, receiving at least $40,000 in annual income. For employee compensation and proprietors' income, however, payments to each type of household are placed in a common income pool (payments to labor and returns to proprietors at the industry level form a single row). Total payments are then allocated to low, medium and high income households based on fixed income shares.

Any change in earnings by a particular industry is treated as a typical or regional average change in income across the three income groups. For example, assume that earnings payments to the three household income groups across all industries in the region were $2 billion to low income households, $7 billion to medium income households and $1 billion to high income households. Then an increase in earnings payments by regional industries to regional households of $100 million would be allocated as $20 million to low income households, $70 million to medium income households and $10 million to high income households. But the distribution of earnings between income levels can vary markedly among different regional industries. For example, assume that an industry had no payments to low income households, $10 million in payments to medium income households and $90 million in payments to high income households. In this case, the average distribution of earnings between households (20 percent to low income, 70 percent to medium income and 10 percent to high income households) would provide an inaccurate representation of the effects on growth by that industry on the regional economy. The results would be driven by the so-called brain-dead SAM, where effects of industry and policy change in the distribution of income cannot be estimated (Alward and

Lindall; Lindall et al.), and overall economic impacts may even be misrepresented.

A major goal of this research project was to examine the impact of industry growth on income distribution. Hence, it was necessary to eliminate the brain-dead SAM problem. This was done by incorporating results from an industry occupation matrix of the regional economy into the hybrid SAM. The result was a hybrid SAM of the 10-parish region that contained estimates of earnings payments by regional industries to each of the three regional household income groups (low, medium and high income households).

To build the industry occupation matrix, an occupational breakdown of workers in the region was obtained from Louisiana Occupational Employment Statistics for 1993 (Louisiana Department of Labor, Research and Statistics Unit 1994). The report gave the occupational breakdown of employment in the state and for all metropolitan parishes by nine major occupational categories. For the three metropolitan parishes in the region (Bossier, Caddo and Webster), the distribution of occupations was obtained directly from this published data.[3] The occupational distribution for the seven nonmetropolitan parishes in the region was assumed not to differ from the occupational structure for all Louisiana nonmetropolitan parishes. The latter was estimated by subtracting the state total by the total for all metropolitan parishes for each occupational category (both sets of values were given in the Louisiana Department of Labor report).

The next step was to estimate the distribution of the nine occupational categories across regional industries. That is, the goal was to estimate industry employment by occupation in real and monetary terms. The occupational total for each of the nine categories was used to adjust the values from the occupational industry matrix for the United States for 1993. The resulting matrix was then converted to dollars, using national earnings

[3] Parishes (counties) are designated as nonmetropolitan versus metropolitan based on Census population and commuting data.

estimates for each of the nine occupational categories. Each column in the matrix represented an industry, with each cell representing total dollars paid to a particular occupation. Hence, the sum of payments by an industry to all occupations had to be consistent with IMPLAN estimates of total pay (earnings). A procedure termed an RAS has been developed in the literature to force consistency between row and column totals of a matrix. Hence, the RAS procedure was done to force consistency with IMPLAN estimates of earnings in the region by industry.[4] The matrix was then aggregated into 17 sectors for consistency with the regional SAM. For each industry, the nine occupations were assigned to one of the three household income categories, based on average earnings per worker in the category. The result was the estimate of earnings for each of the three household income groups (low, medium and high income) by industry category.

The hybrid SAM model provides a picture of economic flows in the region in 1993. The SAM contains several major sections. The interindustry portion of the SAM shows the value of product flows between the industries in the regional economy. Also included as column accounts are purchases by other parts of the regional economy, such as households and government of regional product. The value-added portion of the SAM shows payments to regional factors of production by regional industries plus Indirect Business Taxes (taxes imbedded in prices, such as sales taxes). This part of the table also forms an estimate of gross regional product. Institutional accounts describe the accumulation and distribution of various forms of earned and unearned income.

A SAM expenditure matrix (S) is formed by column normalizing the SAM matrix. This process involves model closure, which is an important issue in SAM analysis. Closure is the determination of which accounts should be endogenous or driven by spending in the regional economy. Mathematically, closure means determining which accounts belong in a matrix inverse. If all

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[4] The RAS was originally developed to allow researchers to update input-output tables for new aggregate observations concerning regional output (Miller and Blair 1985). In the procedure, values in a matrix are adjusted to be consistent with new row and column totals.

accounts were included in the inverse, the matrix is singular and hence has an infinite number of solutions. The decision was made to close the model with respect to households following Holland and Wyeth (1993) and the normal closure rule for I-O models. Hence, the S matrix is the portion of the SAM model that is held to be endogenous (including their interindustry portion of the table, value-added payments to households and payments to other property income). Values in these parts of the SAM were column normalized (each cell was divided by its column total) to form the coefficients in the S matrix. The S matrix was then used to calculate the (I-S) inverse matrix, which is analogous to the Leontief Inverse in I-O models. Each of the columns in the (I-S) inverse matrix contains coefficients showing the changes in activity in the appropriate row industry or sector, as result of a one dollar change in final demand by the industry represented by that column. By adding the columns, the SAM (I-S) inverse can be used to generate economic multipliers and impact analysis for industries in the regional economy.

Results

Forest Products Industry Sector Multipliers

Economic multipliers for the 17 industry sectors in the SAM model of the northwest Louisiana economy are provided in Table 2. Output multipliers show the change in total product across all industries in the regional economy for a one dollar change in sales by the industry in question. Output multipliers of particular interest for this study include the $1.9592 change in total regional output for a $1.00 change in sales by Kitchen Cabinets and Millwork (137). The output multiplier of $2.1787 for Structural Wood Members (140), the output multiplier of $2.1717 for Wood Preserving (145), the output multiplier of $1.8688 for Furniture (148) and the output multiplier of $1.8962 for Wood Partitions (157) were also noteworthy. Output multipliers for three of the five value-added forest products industries were among the top five industrial sectors in terms of output multipliers.

Table 2. Economic Multipliers for All Industries in the Social Accounting Model (SAM) of the Northwest Louisiana Economy in 1993.

		Output Multiplier	Total Income Multiplier	Income Multiplier by Household		
				Low	Medium	High
1	Agriculture	1.7026	0.5451	0.3182	0.1963	0.0307
28	Mining	1.6977	0.5613	0.0816	0.2731	0.2067
48	Construction	1.8271	0.6607	0.1344	0.4785	0.0478
58	Other Manufacture	1.7023	0.5055	0.0786	0.3832	0.0437
133	Logging	1.7772	0.4700	0.1223	0.3245	0.0233
134	Sawmills	2.2681	0.6622	0.1050	0.4876	0.0695
137	Kitchen Cabinets, Millwork	1.9592	0.7679	0.2331	0.5015	0.0333
139	Veneer and Plywood	2.1352	0.6861	0.0975	0.4918	0.0967
140	Structural Wood Members	2.1787	0.7982	0.1869	0.5373	0.0740
145	Wood Preserving	2.1717	0.5788	0.1057	0.4110	0.0621
148	Furniture	1.8688	0.6640	0.2335	0.3737	0.0569
157	Wood Partitions	1.8962	0.7798	0.2155	0.5141	0.0502
433	Transport and Utilities	1.8175	0.6910	0.0873	0.4660	0.1376
447	Trade	1.7362	0.8500	0.2934	0.5327	0.0238
456	Finance and Insurance	1.6714	0.4957	0.1521	0.3054	0.0382
463	Services	1.8981	0.9290	0.2522	0.6496	0.0271
510	Government	1.8933	1.3072	0.1236	1.1596	0.0240

Note: All multipliers based on $1.00 change in output by the industry.

Also provided in Table 2 are the income multipliers that show the effect of increases in one dollar of industry output on total household income and on each of the three household income levels (low, medium and high income households). Total income multipliers for the five value-added forest products industries ranged from $0.7982 for Structural Wood Members (140) (ranked fourth among the 17 industries) to $0.5788 for Wood Preserving (145) (ranked twelfth).

For four of the five value-added forest products industries, multipliers for low income households were larger than average (Table 2). This implies that growth in the five industries may be especially beneficial to low income households. Among the five sectors, Kitchen Cabinets (137) at $0.2331, Structural Wood Members (140) at $0.1869, Furniture (148) at $0.2335 and Wood Partitions (157) at $0.2155 had larger than average increases for low income households.

Impact Analysis

Impact analysis is used to determine either the effect of a particular policy change in regional economic activity or the contribution of growth or decline in a given industry or set of industries on regional economic activity. In this study, growth in the five sectors forming the value-added forest products sectors — Kitchen Cabinets and Millwork (137), Structural Wood Members (140), Wood Preserving (145), Furniture (148) and Wood Partitions (157) — formed the impact analysis scenarios. Impact analysis was performed for three regional value-added forest products industry growth scenarios: a 100 percent increase in output, a 50 percent increase in output and a 25 percent increase in output.

Forest Products Industry Growth: 100 Percent Increase

Total sales by the five industries were an estimated $95.907 million in 1993. Hence, a 100 percent increase in output by the four industries led to a direct impact scenario of that level. The 100 percent increase in industry output was projected to lead to a $202.650 million increase in economic activity in the regional economy (an increase in total output in the 1993 regional economy of 1.1 percent) and 2,264 new jobs. Such a level of growth in value-added forest products industries would provide a fairly substantial increase in overall regional economic activity.

Of the total $202.650 million increase in output, $106.743 million (52.7 percent) occurred in sectors either indirectly affected through industry linkages (indirect effects) or affected by household spending that was supported by the value-added forest products industry (induced effects). Indirect effects were concentrated in the Logging (133) sector at $11.188 million and in the Sawmill (134) sector ($10.699 million) (Table 3). The induced effect caused by household spending had its strongest influence on output in the Trade (447) ($12.850 million), Finance and Insurance (456) ($11.298 million) and Services (463) ($22.992 million) sectors.

Total employment in the region was projected to increase by 2,263 jobs under this growth scenario or an increase from an

employment base of 265,208 jobs of 0.9 percent. Of the 2,263 jobs, 799 jobs (35.3 percent) were generated in the value-added forest products industries, with the largest such job impact occurring in Wood Preserving (145) at 327 jobs (Table 3). The remaining 1,464 jobs created in the rest of the regional economy were concentrated

Table 3. Economic Impact of 100 Percent Increase in Production Levels by Regional Value-added Forest Products Industry on the Northwest Louisiana Economy in 1993.

		Output	Total Income	Income by Household Income Class			Gross State Product	Employment
				Low	Medium	High		
1	Agriculture	2.128	1.160	0.677	0.418	0.065	0.950	43.8
28	Mining	1.043	0.585	0.085	0.285	0.215	0.639	4.1
48	Construction	5.918	3.910	0.796	2.832	0.283	2.514	60.7
58	Other Manufacture	12.044	6.088	0.947	4.615	0.526	3.937	63.1
133	Logging	11.188	5.259	1.368	3.631	0.260	3.148	65.8
134	Sawmills	10.699	7.085	1.124	5.217	0.744	3.415	80.1
137	Kitchen Cabinets, Millwork	2.836	2.178	0.661	1.422	0.094	1.346	47.9
139	Veneer and Plywood	3.812	2.615	0.372	1.875	0.369	1.437	25.7
140	Structural Wood Members	13.531	10.800	2.529	7.270	1.002	5.526	186.3
145	Wood Preserving	62.944	36.435	6.654	25.872	3.909	13.381	327.1
148	Furniture	13.295	8.829	3.104	4.968	0.756	5.078	175.8
157	Wood Partitions	3.945	3.076	0.850	2.028	0.198	1.874	62.6
433	Transport and Utilities	10.254	7.085	0.895	4.779	1.411	5.692	79.0
447	Trade	12.850	10.922	3.771	6.845	0.306	10.119	390.3
456	Finance and Insurance	11.298	5.601	1.719	3.451	0.431	6.980	74.2
463	Services	22.992	21.360	5.800	14.937	0.624	14.539	514.5
510	Government	1.875	2.450	0.232	2.174	0.045	1.780	61.7
	Total	202.650	135.438	31.583	92.617	11.239	82.355	2262.7

Note: All monetary values are in millions of dollars. Estimates are based on SAM model of the regional economy.

in the Services (514 jobs) and Trade (390 jobs) sectors. On average, one job in the value-added forest products set of industries led to 1.83 jobs (the 2,269 total jobs divided by the 799 direct) in the rest of the regional economy.

Total household income was projected to increase by $135.439 million, with $31.583 (23.3 percent) of this total going to low income households, $92.617 (68.4 percent) going to middle income households and $11.239 (8.3 percent) going to high income households (Table 3). Of the $135.439 million, $61.318 (45.3 percent) went to workers directly employed by value-added forest products industries. In examining the distribution of the $61.318 million increase in household income among directly affected workers, $13.799 (22.5 percent) million went to low income households, $41.560 (67.8 percent) went to medium income households and $5.959 million went to high income households.

Increases in gross regional product were projected to equal $82.355 million or a growth of 0.8 percent over 1993 levels (Table 3). Of the $82.355 million increase in gross regional product, $27.205 million (33.0 percent) occurred directly in the five value-added forest products industries. Directly affected sectors with larger changes in their contribution to gross regional product included Wood Preserving (145) at $13.381 million, Structural Wood Members (140) at $5.526 million and Furniture (148) at $5.078 million. Sectors with larger than average indirect impacts included Trade (447) with $10.119 million in regional gross product and Services (463) with $14.539 million in regional gross product.

Forest Products Industry Growth: 50 Percent Increase

Impact analysis was also done for a 50 percent increase in output for the five value-added forest products industries. As indicated in Table 4, the direct change in output in the five industries was $47.954 million, and the total change in output in the regional economy was $101.325 million or a projected gain of 0.5 percent in output over current levels for the entire regional economy. Increases in total regional employment were projected

Table 4. Economic Impact of 50 Percent Increase in Production Levels by Regional Value-added Forest Products Industry on the Northwest Louisiana Economy in 1993.

		Output	Total Income	Income by Household Income Class			Gross State Product	Employment
				Low	Medium	High		
1	Agriculture	1.064	0.580	0.338	0.209	0.033	0.475	21.9
28	Mining	0.521	0.293	0.043	0.142	0.108	0.320	2.1
48	Construction	2.959	1.955	0.398	1.416	0.141	1.257	30.4
58	Other Manufacture	6.022	3.044	0.474	2.308	0.263	1.969	31.6
133	Logging	5.594	2.630	0.684	1.815	0.130	1.574	32.9
134	Sawmills	5.350	3.543	0.562	2.609	0.372	1.707	40.0
137	Kitchen Cabinets, Millwork	1.418	1.089	0.330	0.711	0.047	0.673	24.0
139	Veneer and Plywood	1.906	1.307	0.186	0.937	0.184	0.718	12.8
140	Structural Wood Members	6.765	5.400	1.264	3.635	0.501	2.763	93.2
145	Wood Preserving	31.472	18.217	3.327	12.936	1.954	6.690	163.5
148	Furniture	6.648	4.414	1.552	2.484	0.378	2.539	87.9
157	Wood Partitions	1.972	1.538	0.425	1.014	0.099	0.937	31.3
433	Transport and Utilities	5.127	3.543	0.448	2.389	0.706	2.846	39.5
447	Trade	6.425	5.461	1.885	3.422	0.153	5.060	195.1
456	Finance and Insurance	5.649	2.800	0.859	1.725	0.216	3.490	37.1
463	Services	11.496	10.680	2.900	7.468	0.312	7.269	257.2
510	Government	0.937	1.225	0.116	1.087	0.022	0.890	30.9
	Total	101.325	67.719	15.791	46.308	5.619	41.178	1131.3

Note: All monetary values are in millions of dollars. Estimates are based on SAM model of the regional economy.

to be 1,131 jobs, an increase in total employment in the region of 0.4 percent over 1993 employment levels. The increase in gross regional product over 1993 levels was projected to be $41.178 million or an increase of 0.4 percent.

Forest Products Industry Growth: 25 Percent Increase

Finally, impact analysis was done for a 25 percent increase in output for the five value-added forest products set of industries. The direct change in output in the five industries was $23.977 million, and the total change in output in the regional economy was $50.663 million or a projected gain of 0.3 percent in output over 1993 levels for the entire regional economy (Table 5). The increase in total regional employment was expected to be 566 jobs, an increase in total employment in the region of 0.2 percent over 1993 employment levels. The increase in gross regional product was projected to be $20.589 million, an increase of 0.2 percent over 1993 levels.

Forest Products Industry Growth vs. General Economic Growth

One additional impact scenario was done to compare changes in income distribution under growth in the value-added forest products industries with changes in the general growth in the regional economy. To estimate the impact of general growth, the effect on household incomes of a proportional increase in final demand for all sectors totaling $95.907 million (the same direct increase in output as for the 100 percent value-added forest products growth scenario) was examined. The general growth impact scenario resulted in an increase in regional output of $171.515 million, an increase in regional employment of 2,537 jobs and an increase in gross regional product of $97.112 million. Total household income was predicted to increase by $124.417 million or $11.022 million less than under the 100 percent value-added forest products growth scenario.

Of the $124.417 projected increase in household income under the general growth scenario, $27.884 million (22.4 percent) was expected to go to low income households, $88.010 million (70.7 percent) was expected to go to medium income households and $8.523 million (6.8 percent) was expected to go to high income households. For each household income level, increases in income

Table 5. Economic Impact of 25 Percent Increase in Production Levels by Regional Value-added Forest Products Industry on the Northwest Louisiana Economy in 1993.

		Output	Total Income	Income by Household Income Class			Gross State Product	Employment
				Low	Medium	High		
1	Agriculture	0.532	0.290	0.169	0.104	0.016	0.238	11.0
28	Mining	0.261	0.146	0.021	0.071	0.054	0.160	1.0
48	Construction	1.479	0.978	0.199	0.708	0.071	0.629	15.2
58	Other Manufacture	3.011	1.522	0.237	1.154	0.131	0.984	15.8
133	Logging	2.797	1.315	0.342	0.908	0.065	.787	16.4
134	Sawmills	2.675	1.771	0.281	1.304	0.186	0.854	20.0
137	Kitchen Cabinets, Millwork	0.709	0.544	0.165	0.356	0.024	0.336	12.0
139	Veneer and Plywood	0.953	0.654	0.093	0.469	0.092	0.359	6.4
140	Structural Wood Members	3.383	2.700	0.632	1.817	0.250	1.382	46.6
145	Wood Preserving	15.736	9.109	1.664	6.468	0.977	3.345	81.8
148	Furniture	3.324	2.207	0.776	1.242	0.189	1.270	44.0
157	Wood Partitions	0.986	0.769	0.213	0.507	0.050	0.469	15.6
433	Transport and Utilities	2.564	1.771	0.224	1.195	0.353	1.423	19.7
447	Trade	3.212	2.730	0.943	1.711	0.077	2.530	97.6
456	Finance and Insurance	2.824	1.400	0.430	0.863	0.108	1.745	18.6
463	Services	5.748	5.340	1.450	3.734	0.156	3.635	128.6
510	Government	0.469	0.613	0.058	0.543	0.011	0.445	15.4
	Total	50.663	33.860	7.896	23.154	2.810	20.589	565.7

Note: All monetary values are in millions of dollars. Estimates are based on SAM model of the regional economy.

were projected to be less than those projected under the 100 percent value-added forest products growth scenario.

A comparison of results under the general growth impact scenario to the 100 percent value-added forest products growth scenario provided mixed evidence about the contribution of the value-added forest products sector to income equality in the

regional economy. Increases in income for low income households were greater in absolute ($31.583 million versus $27.884 or 13.3 percent higher) for the 100 percent growth in value-added forest products scenario versus the general growth scenario (Table 6). Low income households also had greater increases in income in relative terms (23.3 percent versus 22.4 percent of the total increase in household income) under the forest products scenario. However, the 100 percent growth in value-added forest products scenario resulted in a larger increase in income going to high income households in absolute ($11.239 million versus $8.523 million or 31.9 percent higher) and relative terms (8.3 percent versus 6.8 percent of the total increase in household income).

Hence, the effect of growth in value-added forest products on income inequality in the regional economy is ambivalent. One can argue that such growth would increase income inequality in the regional economy by increasing the share going to high income households. Growth can be seen as reducing income inequalities by increasing the share of income going to low income households, however. If the policy goal is to create economic opportunities for low income households, then model results imply that efforts aimed at the development of the value-added forest products industry would be more effective than efforts aimed at facilitating general economic growth.

Table 6. Distribution of Households Spending Impacts on the Northwest Louisiana Economy in 1993 due to 100 Percent Increase in Production Levels by Regional Value-added Forest Products Industry Versus General Increase in Economic Activity.

	Low Income Households	Medium Income Households	High Income Households	Total Household Income
100 Percent Value-added Forest Products Growth				
Absolute (millions of $)	31.583	92.617	11.239	135.438
Percentage	(23.3)	(68.4)	(8.3)	(100.0)
General Growth				
Absolute (millions of $)	27.884	88.010	8.523	124.417
Percentage	(22.4)	(70.7)	(6.8)	(100.0)

Note: Increase in direct sales under both scenarios equaled $95.907 million. General economic growth total distributed between regional industries based on distribution of final demand in the regional SAM.

Summary and Conclusions

Because of plentiful input supplies and access to output markets, interest in the potential of the value-added forest products industry has been increasing as a means of facilitating economic development. The value-added forest products industry has the potential for supporting economic growth in rural areas of Louisiana.

A SAM model of 10 parishes in northwest Louisiana was developed to evaluate the impact of growth in the value-added forest products industry on the regional economy. Results from the model indicate that growth in the sector would make a contribution to overall economic activity in the region. A 100 percent increase in sales by the industry would lead to a $202.650 million increase in economic activity in the regional economy (an increase in total output in the 1993 regional economy of 1.1 percent). The same increase in sales would create 2,264 new jobs (an increase of 0.9 percent over the 1993 job base). Results from the SAM also indicate that development of the industry is an appropriate way to create economic opportunities for lower income households. Specifically, model results indicated that a 100 percent increase in production would generate $31.583 million in income for low income households.

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Executive Summary

The contribution of the entire forest products sector to economic development, especially in rural areas, is becoming increasingly recognized. This recognition is part of the shift in the focus of federal land management policy to include broader concerns in addition to maximum sustainable wood harvest levels. Concerns that relate to economic development, such as income distribution and community stability, have become prominent.

The value-added forest products industry has the potential for facilitating economic growth in Louisiana. The industry includes firms such as cabinet makers, who enhance the economic value of local resources. The industry is growing, local supplies of raw material inputs are readily available and large viable output markets exist in Louisiana and in the nearby Dallas-Fort Worth metropolitan area. Development of the forest products sector is especially important, because economic activity in many traditional export base industries, such as mining and row crop agriculture, continues to decline in several areas.

This research focuses on estimating the impacts of feasible growth in the value-added forest products industry on the economy of a 10-parish region in northwest Louisiana. An emphasis is placed on examining the distributional consequences of this growth. The expectation is to provide policymakers with an idea of the sector's possible contribution to total economic activity and to income distribution in the region.

Interindustry models, such as Input-Output models, are established procedures for examining the effects of the development of a particular industry on a regional economy. A regional Social Accounting Matrix (SAM) explicitly models market and nonmarket economic flows including the flow of income from industries to households (which provide factors of production to the industries). Researchers often use SAMs to examine changes in the distribution of income under alternative scenarios. The model used in this study is a SAM of a 10-parish region in northwest Louisiana. The SAM is used to examine the impact of various growth scenarios in the value-added forest products industry.

Results from the model indicate that growth in the sector would make a contribution to overall economic activity in the region. A 100 percent increase in sales by the industry would lead to a $202.650 million increase in economic activity in the regional economy (an increase in total output in the 1993 regional economy of 1.1 percent). The same increase in sales would create 2,264 new jobs (an increase of 0.9 percent over the 1993 job base). Results from the SAM also indicate that development of the industry is an appropriate way to create economic opportunities for lower income households. Specifically, model results indicated that a 100 percent increase in production would generate $31.583 million in income for low income households.

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