MEASURING THE ECONOMIC CONTRIBUTION OF FOREST INDUSTRIES

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Abstract.--The forest-based industries make a large contribution to a regional economy. Six criteria are presented to indicate a comprehensive procedure for measuring economic contribution, and qualitative results in Alabama show the industry to be the State's leading industry. Though its growth has been steady and it is now a very large industry, its future depends to a large extent on macroeconomic policy which implies its future is uncertain.

There is no question but that the Southern forest economy has been rapidly growing and developing for several decades. Throughout most of the South, growth of the forestry sectors has exceeded average regional rates, implying that forestry is becoming a relatively more important sector. While these general observations may be appreciated by forestry audiences, they are not general knowledge in the various Southern states.

In Alabama, we have devoted much effort to documenting the "contribution" that forestry and associated industries make to the State economy. At the heart of the effort is an attempt to identify or interpret the meaning of the forest industries to the regions in which they reside. It is a process that involves compilation of data and analytical models; but it goes beyond that to more general assessments or weighings of information to produce a picture of forestry in relation to other activities.

MEASURING CONTRIBUTION

Zinn (1972) made the first effort to describe the contribution of forestry to a regional economy. He used New York as his study area, and outlined ten criteria by which economic contribution could be identified. Bowers (1980) modified Zinn's work to produce a list of six criteria and applied them to Alabama. While not exhaustive of an industry's attributes, the criteria measure a broad range.

The criteria are:

1. The historical role of the sector in the region.
2. The amount of economic activity generated by the sector.
3. The productivity of the sector.
4. The direct effects of the sector on individual welfare.
5. The contribution of the sector to regional economic stability.
6. The secondary effects of the sector on the region.

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The economic history of an industry provides a sense of fitness. The different social and historical contexts of various regions indicate to what extent various industries can easily coexist. An industry with a long history in a region—especially an industry that ties people to the land—tends to be a more intimate neighbor. It helps provide a cultural identity, a sense of place, and it frequently becomes the subject of myth and folklore. An industry's history is also likely to indicate the extent and quality of the labor force and social overhead capital necessary for the industries continued expansion. It provides knowledge about the past problems and successes, indicating what difficulties and opportunities might be in the future.

The amount of economic activity of an industry, that is, its size, is an important indicator of its current economic contribution. The best single indicator of the size of an industry's contribution is value added in manufacturing (US Department of Commerce 1980). Value added avoids the double counting implicit in final sales figures. It is also an industry's contribution to the gross national product. While value added is published by the US Department of Commerce for manufacturing industries, it is not computed for agriculture and other primary industries. To compare the size of agriculture with forestry, estimates must be made of agriculture's value added.

Employment and payroll data are also useful indicators of an industry's size and contribution. The amount and character of employment, whether high or low wage, are closely watched by regional policy makers.

The productivity of a sector indicates the relative economic vitality of the sector and its ability to compete for resources. If wages tend to change with average changes in productivity for the region, then industries with lagging productivity will be faced with higher real costs. They will be forced to raise their prices and be less competitive in the long term (Baumol 1967). The industries in the best position to compete will be those with high rates of productivity growth.

A sector's direct effect on individual is measured by average wage rates, fringe benefit packages, and working conditions. While the latter two are subjective in nature, they do help define the character an industry's relations with its employees.

Stability in income and employment is a common social goal, and industries that produce steady benefits are highly valued. Variation in output and employment over time are used as indicators of stability. In addition, an industry's geographic distribution indicates stability over space. Fluctuations in activity over time are more easily accommodated if they are spread over an entire region rather than a few localities.

Finally, the secondary effects of an industry indicate connections with the rest of the economy. These effects are measured with input-output multipliers which define changes in sales, incomes, and employment throughout an economy as a function of change in particular industries. Input-output analysis is analytically simple and requires huge amounts of real data. It is one of the most widely used models for studying industrial structure in regional economies.
In a truly thorough analysis, the criteria outlined above would be used to study several of a region's major industries over several years and in comparison with similar industries in competing regions. Such an analysis would provide a complete statement of an industry's absolute contribution as well as its comparative contribution. Unfortunately, it is not possible to present so much data in a small paper.

The work done in Alabama is outlined in a series of publications and theses (Flick and Kelly 1978a and b; Bowers 1979; Trenchi 1979; Ingram and Flick 1980; Flick 1980; Flick, Trenchi, and Bowers 1980; Flick 1981; Trenchi and Flick 1982; Flick 1983; Stallings and Flick 1984; Tan 1984; and Dempsey 1985). The work has had two main directions: first, input-output modelling, and second, analyzing forestry's contribution.

QUALITATIVE RESULTS IN ALABAMA

Forestry and associated industries have a long and colorful history in Alabama and other states of the mid-South. Over the last 100 years, the industry evolved from a lumber industry that cut and moved to an integrated wood industry dominated by pulp and paper and dedicated to growing wood. Today, Alabama and forestry are well acquainted. Alabama has a large labor force accustomed to woods work, a large system of support businesses ranging from lawyers and accountants who specialize in forestry to truck and tractor dealers. There are active public programs supporting forestry, and large and diverse transportation systems including water, rail, and highway facilities.

The forest industries now have the largest valued added of any major industry in the State, having exceeded primary metals in 1977. By 1980, the combined value added of forest industries (Standard Industrial Classification (SIC) 24 and 26) was $1.75 billion, exceeding textiles ($0.85 billion), apparel ($0.78 billion), chemicals ($1.07 billion), rubber and plastics ($0.84 billion), primary metals ($1.24 billion), and fabricated metals ($0.91 billion) (U.S. Department of Commerce 1980).

Even when compared with agriculture, Alabama's traditional heavyweight, forestry is apparently larger. Value added data are not computed for agriculture by the US Government, but estimate can be made from data published by the US Department of Agriculture (1984). The approach is to net out the cost of identifiable raw materials from agricultural gross receipts. Raw materials include the cost of feed, livestock, seed, fertilizer and lime, and miscellaneous. Value added in primary agriculture can then be added to that in food processing (SIC 20) to obtain a total comparable to that of the forest products industry. The results indicate that forest-based activity has a larger value added in Alabama ($1.75 billion in 1980) than all of agriculture ($1.54 billion in 1980). In an agriculturally oriented state like Alabama, these results can be startling information, especially to state legislators.

The forest-based industries are also one of the State's largest employers, usually ranking first or second along with the Apparel industry. In 1980, employment in forest-based industries was 48.1 thousand employees,
ranking second behind apparel at 53.9 thousand employees (Alabama Department of Industrial Relations 1982).

The productivity of Alabama's forest-based industry is variable in comparison to other industries in Alabama. The paper industry has the highest productivity rates (value added per man hour) of any of Alabama's major industries, while the lumber and wood products industry is among the lowest.

Lumber has gained a reputation as an industry with lagging rates of productivity (Zaremba 1958). In more recent years, however, the advent of chip 'n saw technology, automated sorting, and other improvements, along with the rapid decline in the number of small, inefficient, portable sawmills, the rates of productivity have been growing (Kaiser and Guttenberg 1970).

Like productivity, the forest-based industries effects on individual welfare vary widely depending on the component of the industry. Average hourly wage is the principal measure of the effect. In Alabama, the paper industry has the highest average hourly earnings ($12.22/hr.) of any of the major industries being compared. Lumber, on the other hand, is near the bottom of the list ($6.42/hr.), just above textiles ($6.41/hr.) and apparel ($5.22/hr.) (Alabama Department of Labor Relations 1984).

In a general sense, Alabama's forest-based industries contribute to the economic stability of the State. Historically, the lumber industry in Alabama and elsewhere is known for its huge fluctuations in activity. The industry was heavily populated with small mills until the 1970s, and when demand was high, many mills operated at full capacity. When the housing cycle depressed demand for structural lumber, many of the small mills would close. During the late 1950s and 1960s, many of these mills were forced out of business by larger, lower cost, more technologically advanced, sawmills. As a result, the South's average competitive position improved along with its ability to maintain production during periods of slack demand.

During the 1960's and 1970's, the southern plywood industry was born and grew to dominate the U.S. industry. Again, the mills are relatively new and efficient. Similar trends occurred in the paper industry. As a result, in the latest recession of 1981-1982, the forest-based industries of Alabama offered more stable employment opportunities than other industries in Alabama and probably more than the forest-based industries of other regions (Flick 1983, Dempsey 1985).

Industries also vary regarding their geographic distribution over a region. A large industry which is highly concentrated in a small area will tend to have a dramatic effect on the small area in which it exists. In Alabama, the primary metals industry is concentrated in the Birmingham area, and when employment declined by nearly 50% over a several year period, the impacts on the Birmingham economy were severe. The State's forest based industries, alternatively, are distributed more evenly over the State, though still more concentrated in the southern half. Since the impacts of short-term variation in economic activity are distributed over a wide area, they are more easily accommodated by other sectors of the economy with which forestry has close ties.
A final indicator of economic contribution is the secondary effects of an industry on a regional economy. These effects can be measured by the economic multipliers associated with an input-output model. The input-output model of Alabama used in these comparisons was a 25 endogenous sector model constructed from a combination of primary and secondary data (Flick, Trenchi, and Bowers 1980; Trenchi and Flick 1982). The initial model has been in almost continual revision since its initial publication, and it now incorporates the results of surveys of all its endogenous sectors except agriculture. Type 1 and 2 output (sales), income, and employment multipliers can be calculated from the model, and they indicate that the forest-based industries have a greater secondary effect on the State economy than other manufacturing sectors as well as greater than the average of all sectors in the model (Flick, Trenchi, and Bowers 1980).

That forest-based industries have a disproportionately large secondary effect on a regional economy is not an unexpected result to someone familiar with the operation of those industries. All of the major components of the industry rely heavily on local businesses for raw materials. Wood, trucks, logging equipment, contract services for mill maintenance, legal services, land surveying, and other materials and services are usually purchased locally. In contrast, most other industries purchase a smaller part of their inputs locally. The result is that forest-based industries provide a greater stimulus to other local firms, which implies relatively larger economic multipliers.

DISCUSSION

The results of a thorough examination of forestry's contribution to Alabama's economy indicate it has grown rapidly in the recent past, is now the State's largest industry and one of its largest employers, has benefited from good gains in productivity, has a variable direct effect on individual welfare, contributes to regional stability, and has genuinely larger secondary effects on the State than other industries. In total, its an impressive picture.

This is not to say, however, that the industry is without problems. The industry is capital intensive and sensitive to interest rates, and in recent years when real interest rates have been so high, the forest industries have been under severe pressure. In Alabama, if the existing mills are not continually modernized through new investment, other regions with newer technology will survive economic dips better.

Alabama's paper industry is sensitive to international market conditions, and the recent strength of the U.S. dollar has temporarily made it very difficult for American manufacturers to compete internationally. Production at several mills in Alabama has recently slowed in direct response to such pressure, and wood markets have also deteriorated. The lumber industry in the State (and the rest of the South) has been under pressure from Canadian imports, again a result in part of the strength of the U.S. dollar.
Although the industry's contribution is large, it is not independent of the larger economic context in which it operates. As with other capital intensive industries, the forest-based industries are sensitive to macroeconomic policy. Because of this, while their future looks bright, it is also uncertain.

LITERATURE CITED


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