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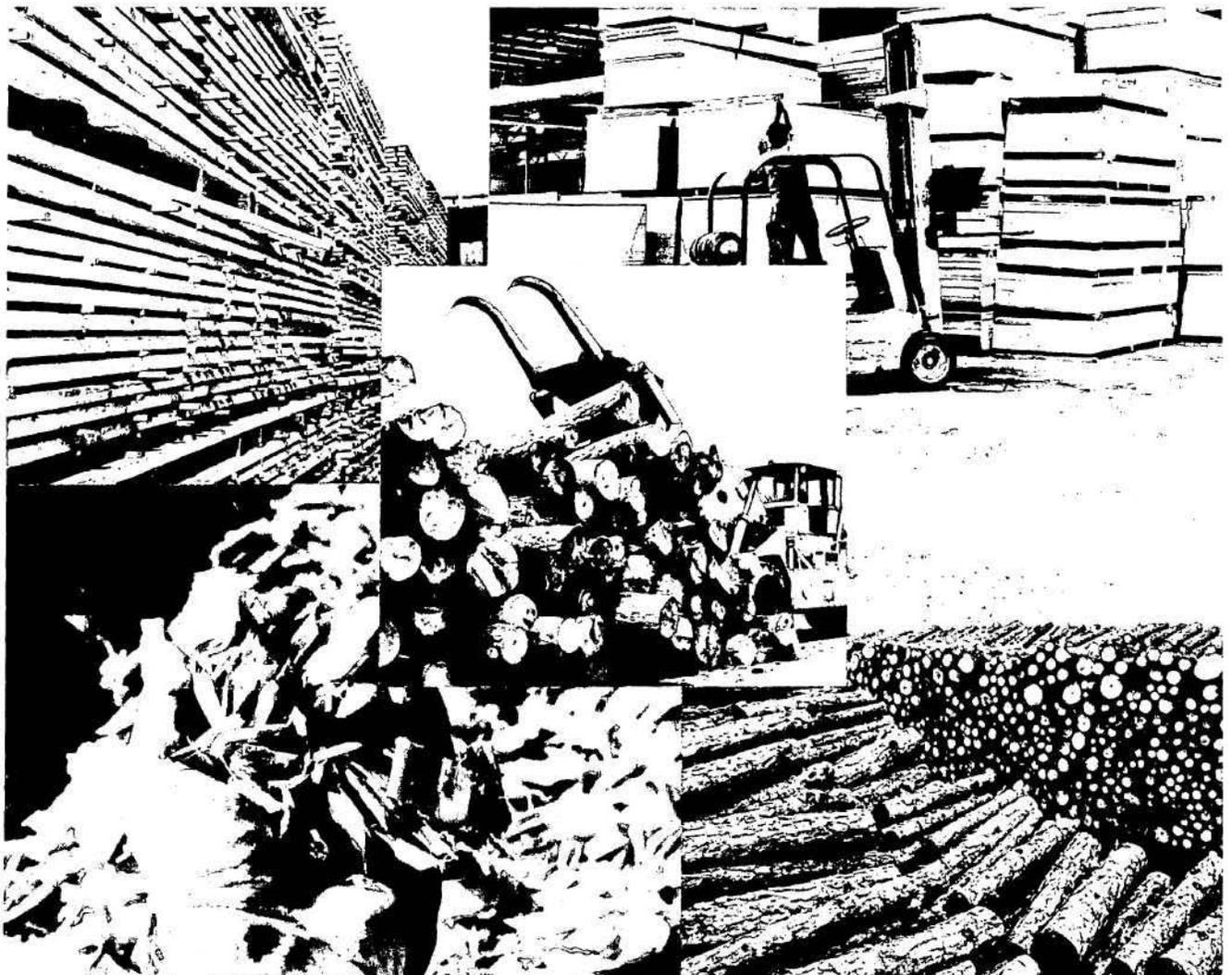
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EDITOR'S  
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# NORTH CAROLINA'S Forest Products Industry: Performance and Contribution to the State's Economy, 1970 to 1980

Con H Schallau, Wilbur R. Maki, Bennett B. Foster, and Clair H. Redmond



## Abbreviations

### States

AL Alabama  
AR Arkansas  
FL Florida  
GA Georgia  
KY Kentucky  
LA Louisiana  
MS Mississippi  
NC North Carolina  
OK Oklahoma  
SC South Carolina  
TN Tennessee  
TX Texas  
VA Virginia  
SO South  
US United States

### Industries

FPI Forest Products Industry  
LWP Lumber and Wood  
Products  
PAP Paper and Allied  
Products  
WF Wood Furniture

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## Abstract

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Employment and earnings in North Carolina's forest products industry, like those of most Southern States, grew significantly between 1970 and 1980. The forest products industry accounted for a larger share of the State's economic base in 1980 than in 1970. North Carolina had more forest products industry employment than any other State in the South. Moreover, during this period, the State increased its share of the Nation's forest products industry employment and earnings. Pulp and allied products had the highest productivity in 1977 and the largest increase in productivity between 1972 and 1977.

Keywords: Forest products industries, economics (forest products industries), North Carolina.

## Preface

North Carolina's forest products industry, like that of most Southern States, experienced significant growth during the 1970's. This resurgence resulted from the increasing size and amount of timber, investment in new plants and equipment, and a growing demand for North Carolina's forest products.

This report briefly describes North Carolina's forest products industry—its composition, location, evolution, and relation to economic activity elsewhere in the State, the South, and the Nation.

Estimates of employment and earnings shown in this report were derived from U.S. Department of Commerce data. All references to dollar amounts are in constant 1977 dollars.

This is one in a series of reports for each of the 13 Southern States. These reports are companions to a forthcoming analysis of the changing roles of the forest products industries of the South and the Pacific Northwest.

## Highlights

- In 1980, North Carolina had more employment in the forest products industry than did any other Southern State. The forest products industry was the second largest component of North Carolina's economic base (a State's economic base being comprised of industries producing for export outside the State). Furthermore, the forest products industry was a larger component of the State's economic base in 1980 than it was in 1970.
- In 1980, wood furniture manufacturing was the largest component of the State's forest products industry in terms of employment and earnings. North Carolina accounted for 26 percent of the Nation's wood furniture manufacturing employees and 24 percent of the earnings. During the 1970's, wood furniture and paper and allied products were the fastest growing segments of North Carolina's forest products industry in terms of employment. Paper and allied products was the fastest growing in terms of earnings.

- In 1977, wood furniture manufacturing accounted for the largest share of value added by North Carolina's forest products industry. Paper and allied products, however, showed a significantly greater increase in the rate of growth between 1972 and 1977.
- North Carolina's forest products industry was last in the South in terms of capital productivity (measured in terms of value added, minus payroll, per worker hour). In terms of percentage of change between 1972 and 1977; it tied for fifth place among the 13 Southern States.
- In 1977, paper and allied products had the highest capital productivity in the State's forest products industry and exhibited the greatest increase in productivity between 1972 and 1977.
- During the 1970's, North Carolina increased its share of both the Nation's employment and earnings in the forest products industry.
- In 1980, average earnings in North Carolina's forest products industry were below the average for the Nation's forest products industry. Between 1970 and 1980, the growth in earnings in North Carolina's forest products industry was less than the rate for the Nation's forest products industry.
- Earnings per worker in North Carolina's paper and allied products manufacturing were significantly greater than the earnings in the other segments of the forest products industry.
- In 1980, only two Southern States (Mississippi and Arkansas) were more dependent on the forest products industry than was North Carolina.
- In 1977, the forest products industry in North Carolina produced more value added than did its counterparts in all other Southern States.

## Contents

|   |
|---|
| <b>1 The Forest Products Economy of North Carolina</b>                    |
| 1 The State's Workforce   |
| 2 Components of the State's Economic Base                                 |
| 4 Geographical Importance of the State's Forest Products Industry         |
| 5 Composition of the State's Forest Products Industry                     |
| 6 Average Annual Earnings per Worker                                      |
| 7 Value Added by the Forest Products Industry                             |
| 8 Capital Productivity  |
| <b>9 The Forest Products Industry in the South</b>                        |
| 9 Importance of the Industry Across the South                             |
| 10 Industry Composition   |
| 12 Growth of Employment   |
| 13 Average Annual Earnings  |
| 14 Shift in Employment and Earnings                                       |
| 16 Value Added by the Forest Products Industry                            |
| 17 Capital Productivity   |
| <b>18 Appendix 1</b>  |
| 18 Tables   |
| <b>22 Appendix 2</b>  |
| 22 North Carolina Counties by Substate Planning and Development Districts |

**The Forest Products  
Economy of North  
Carolina**  
**The State's Workforce**

North Carolina's estimated full- and part-time workforce in 1980 was comprised of an estimated 2.9 million employees and proprietors (see appendix tables for sources of employment and earnings data). Unlike most Sun Belt States, North Carolina's workforce grew slightly more slowly between 1970 and 1980 than did the national average (21.3 percent versus 22.3 percent). But total earnings—wage and salary payments and proprietorial income—grew faster than the national average. Measured in constant 1977 dollars, the State's earnings increased by 32.6 percent as compared to 27.4 percent for the Nation. As can be seen in the following tabulation, manufacturing, services, and State and local government were the State's three largest employer categories:

| <b>Employers</b>  | <b>Percent of total employment,<br/>1980</b> |              |
|---|--|--------------|
|   | <b>North Carolina</b>                        | <b>U.S.</b>  |
| Major industries:   |  |              |
| Manufacturing (including the<br>forest products industry) | 28.31  | 19.15        |
| Services  | 13.58  | 18.22        |
| State and local government                                | 12.20  | 12.56        |
| Retail trade  | 12.09  | 14.18        |
| Nonfarm proprietors                                       | 6.24   | 6.58         |
| Agriculture   | 6.13   | 4.39         |
| Wholesale trade   | 4.19   | 4.97         |
| Construction  | 4.10   | 4.08         |
| Transportation, communication,<br>and public utilities    | <u>4.03</u>                                  | <u>4.84</u>  |
| Subtotal  | 90.87  | 88.97        |
| All other industries                                      | <u>9.13</u>                                  | <u>11.03</u> |
| Total   | 100.00                                       | 100.00       |

## **Components of the State's Economic Base**

Along with total employment there is another and perhaps more important way to judge an industry's contribution to North Carolina's economy. For the State's economy to grow and develop, it must attract new dollars so residents can buy goods and services produced elsewhere. The industries that export products and services beyond local boundaries (that is, to elsewhere in the State, to other States, and to the world) and bring in new dollars, constitute the area's economic base. Generally speaking, most manufacturing employment is classified as "economic base" (or "basic"), while service or residentiary employment (for example, barber shops, realty firms, schools, and local government) is primarily geared to producing for local needs. Federal military provides national defense for all the Nation's citizens. Furthermore, taxpayers outside North Carolina help support this activity; consequently, Federal military qualifies as a basic industry.

Residentiary employment is supported by the economic base. Money flowing in provides income for wage earners and entrepreneurs to spend on locally purchased goods and services. In most cases, the economic growth of a region is dependent upon the success of its economic base.

We used the excess employment technique to identify the industries that comprise North Carolina's (or the substate district's) economic base. This approach accepts the national distribution of employment among industries as a norm. Any industry with employment in excess of this norm is considered to be producing for export markets outside the State (or substate district) and is part of North Carolina's economic base. The percentage of North Carolina's excess employment served as an indicator of the State's dependency on a particular industry for generating new dollars from outside the State. (Table 2 shows how excess employment and industry-dependency indicators for North Carolina were calculated.) A particular industry may be basic at the local level but not at the State level.

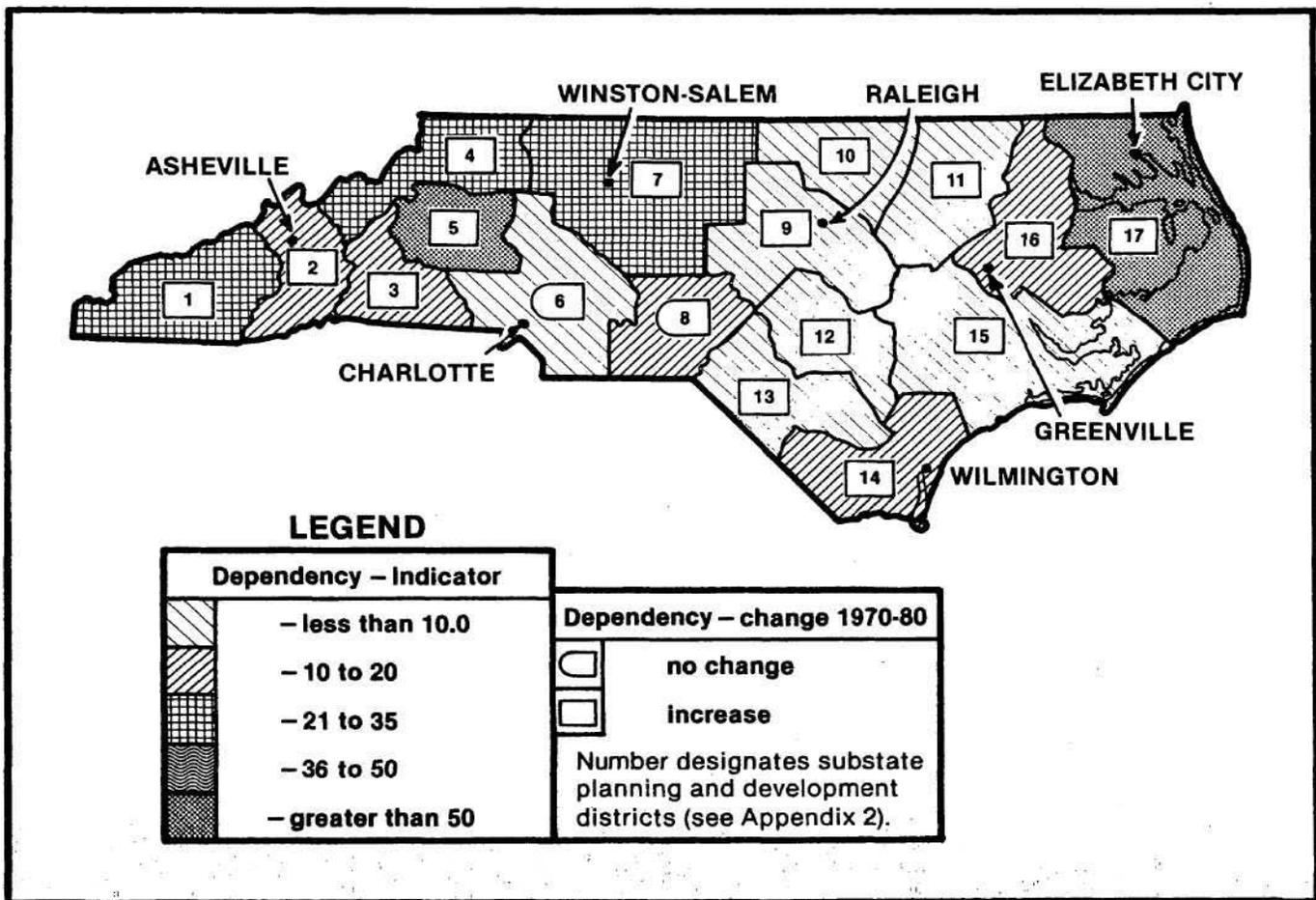
In 1980, ten industries accounted for 99 percent of the State's excess employment—that is, its economic base (see tabulation below). Though these same industries accounted for approximately the same share in 1970, the change in shares of certain individual industries is noteworthy. Agriculture, for example, was less important in 1980 than in 1970. The forest products industry gained in importance between 1970 and 1980. Meanwhile, the State's most important basic industry—textile and apparel—experienced a slight gain in importance.

| <b><u>Economic base industries</u></b> | <b><u>Dependency indicator</u></b> |                    |
|--|------------------------------------|--------------------|
|  | <b><u>1970</u></b>                 | <b><u>1980</u></b> |
|  | <b>(Percent of economic base)</b>  |                    |
| Textiles and apparel                   | 53.35                              | 53.73              |
| Forest products <sup>1/</sup>          | 11.71                              | 16.34              |
| Agriculture                            | 18.13                              | 10.36              |
| Federal military                       | 9.55                               | 9.24               |
| Tobacco                                | 4.84                               | 4.56               |
| Trucking and warehousing               | 1.26                               | 1.82               |
| Chemical and allied products           | —                                  | 1.72               |
| Rubber and miscellaneous plastics      | —                                  | .77                |
| Other furniture and fixtures           | —                                  | .37                |
| Mobile homes                           | .14                                | .35                |
| Subtotal                               | 98.98                              | 99.26              |
| All other basic industries             | 1.02                               | .74                |
| Total                                  | 100.00                             | 100.00             |

<sup>1/</sup>The forest products industry is comprised of (1) lumber and wood products (SIC 24), except mobile homes (SIC 2451); and (2) wood furniture manufacturing (SIC 2511, 2512, 2517, 2521, and 2541), and paper and allied products (SIC 26).

**Geographical Importance of the State's Forest Products Industry**

The contribution of the forest products industry to North Carolina's economic base varies considerably between substate districts (see Appendix 2 for a listing of counties by district). Generally speaking, the forest products industry is less important in the central part of the State than elsewhere. For example, the forest products industry accounts for at least 20 percent of the economic base (that is, those industries producing for export to areas outside the district, or State, and the rest of the world) in the western third of the State, but less than 10 percent in the Raleigh area. Furthermore, the forest products industry accounts for more than 50 percent of the economic base of the State's northern coastal zone. North Carolina's dependency on the forest products industry to produce exports increased in most substate districts between 1970 and 1980. The exception was in the central part of the State, where the dependency on the forest products industry did not change.

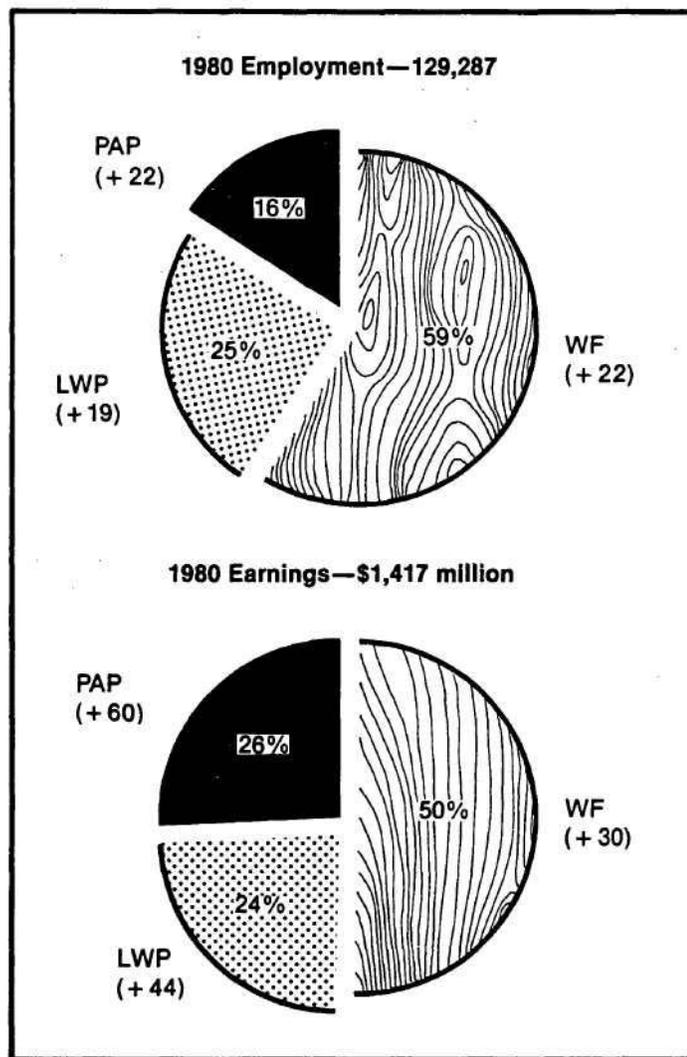


Source: Substate estimates for 1970 and 1980 were derived from unpublished county data series provided by the U.S. Department of Commerce, Regional Economic Information System, Washington, DC; and from the Department's *County Business Patterns*. The numbers in the squares and circles used to designate substate districts correspond to the geographical classification of counties as shown in Appendix 2.

**Composition of the State's Forest Products Industry**

North Carolina's forest products industry is comprised of paper and allied products, lumber and wood products (not including mobile homes), and wood furniture manufacturing. In 1980, wood furniture manufacturing accounted for the largest share of approximately 129,000 workers employed by North Carolina's forest products industry. It also had the largest share of 1980 earnings. North Carolina accounted for 26 percent of the Nation's wood furniture manufacturing employees and 24 percent of the earnings.

During the 1970's, employment in all segments of the State's forest products industry increased. Growth in FPI employment, however, was slower than the average for all industries in the Nation (22.3 percent). But earnings for all three segments exceeded the national average (27.4 percent). Growth of wood furniture earnings lagged behind those in paper and allied products and in lumber and wood products.

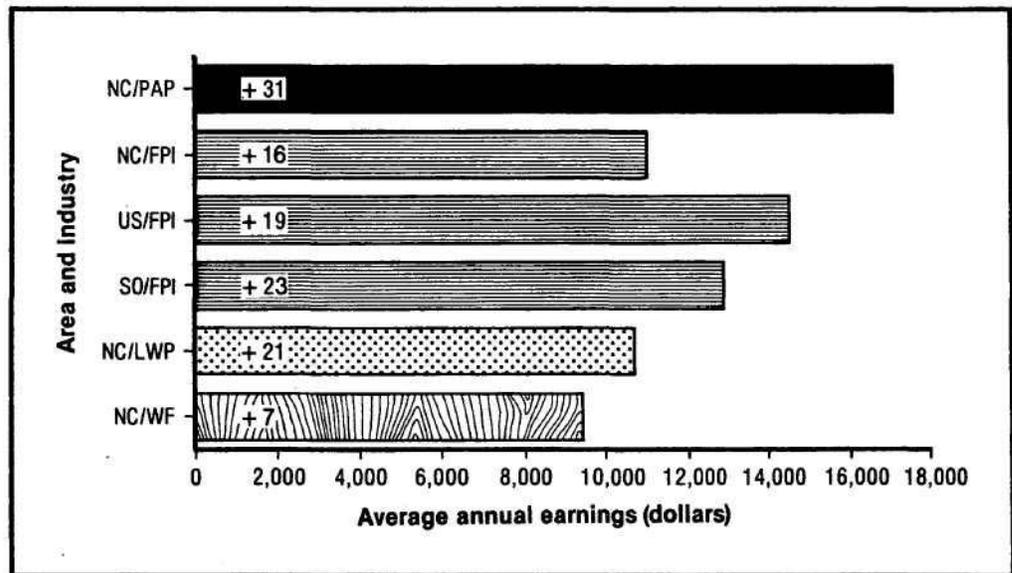


Numbers in parentheses show percentage of change from 1970 to 1980.

### Average Annual Earnings per Worker

Average annual 1980 earnings per worker in paper and allied products were significantly greater than were earnings in the other two components. Higher average skill levels, capital investment per worker, and unions account for this difference. Earnings in the wood furniture component were nearly half those in paper and allied products and significantly below the average in all forest products industries in the South and the United States.

Average annual earnings in North Carolina's forest products industry were significantly less than the average for the forest products industry in the South or in the rest of the Nation. Moreover, growth in earnings was less for North Carolina than for the South and the Nation. Growth and the level of earnings for wood furniture were considerably less than for the rest of the forest products industry in North Carolina, the South, and the United States.

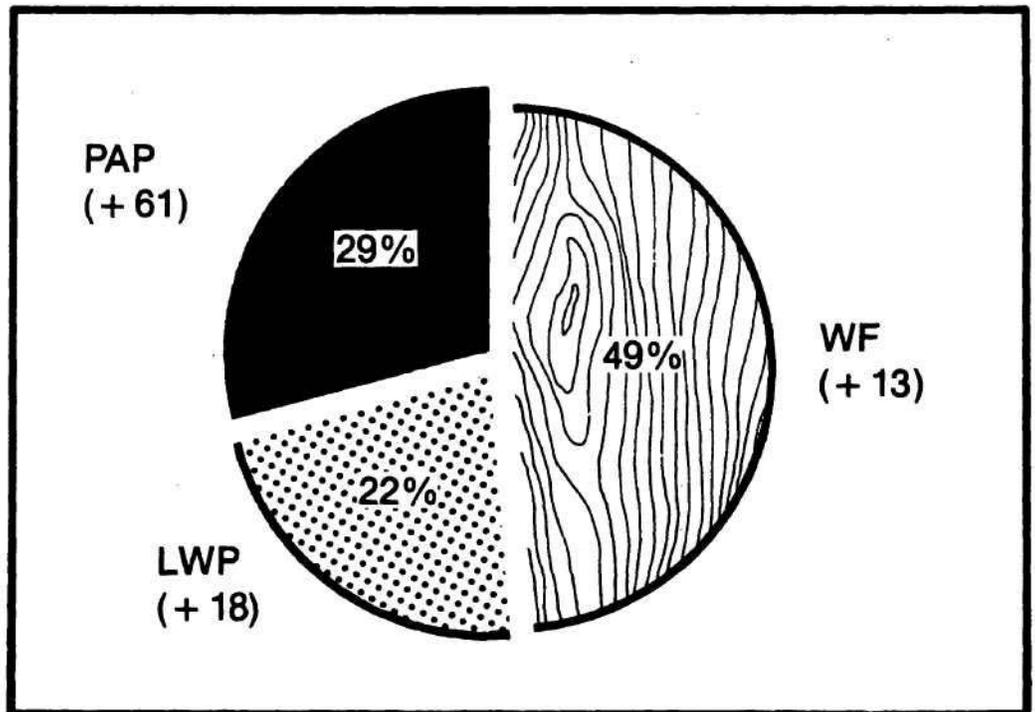


Numbers in bars show percentage of change from 1970 to 1980.

**Value Added by the Forest Products Industry**

Value added by manufacturing represents income payments directly to workers and business owners. It is equal to the value of shipments less the cost of materials, parts, supplies, fuel, goods purchased for resale, electric energy, and contract work. Unlike value of shipments, value added avoids double counting. Consequently, value added by manufacturing is considered the best monetary gauge of the relative economic importance of a manufacturing industry.

In 1977, wood furniture accounted for nearly half of the \$2.4 billion of the value added by North Carolina's forest products industry. But between 1972 and 1977, the value added by paper and allied products grew nearly five times as fast as that of wood furniture.

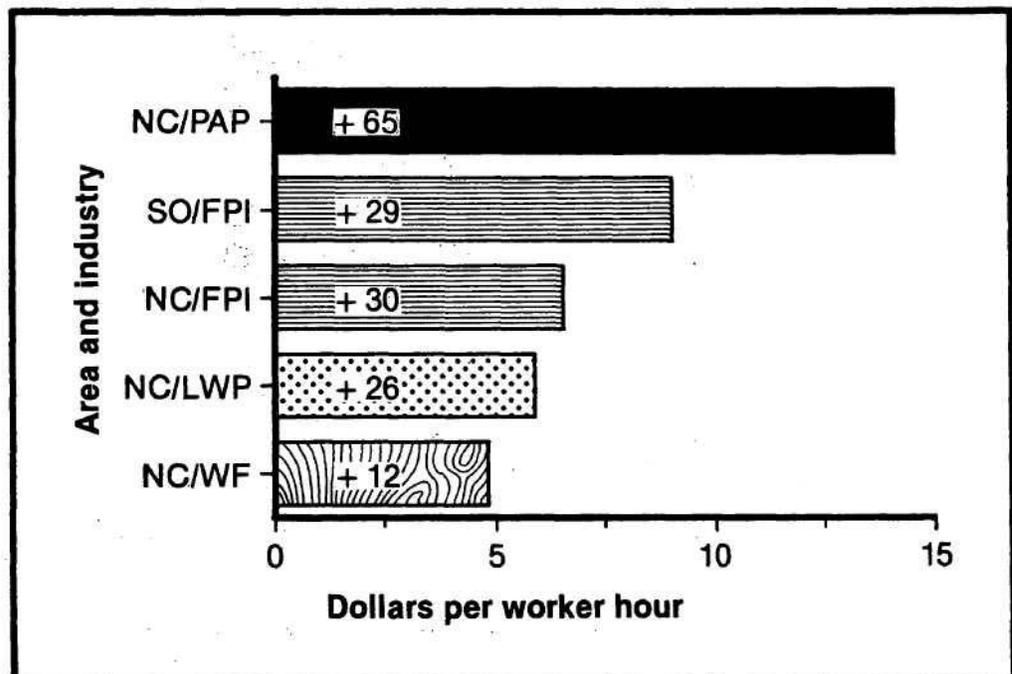


Numbers in parentheses show percentage of change from 1972 to 1977

## Capital Productivity

Increases in productivity are necessary for an industry to remain competitive in the marketplace. Capital productivity of an industry is measured in terms of value added minus payroll—VAMP (see table 3 for an explanation of how capital productivity was calculated for North Carolina's forest products industry). This measure of productivity adjusts for wide differences in payroll among industries and represents the return to capital investment and entrepreneurship.

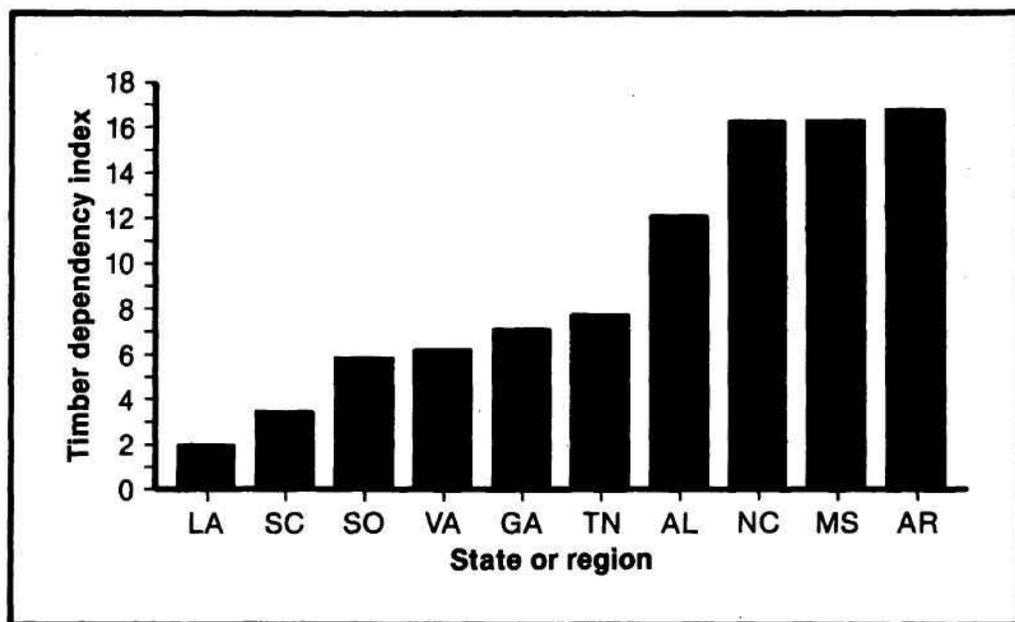
Not surprisingly, paper and allied products had the highest productivity in North Carolina's forest products industry. This component is more capital intensive and in the past has attracted considerable investment in new facilities and equipment. Furthermore, during the mid-1970's, it exhibited a larger gain in productivity than either the lumber and wood products or wood furniture. The relatively low productivity of wood furniture as compared to the rest of the forest products industry reflects the labor-intensive nature of its manufacturing process.



Numbers in bars show percentage of change from 1972 to 1977.

**The Forest Products Industry in the South**  
**Importance of the Industry Across the South**

The dependency indicators suggest that, in 1980, all but four States in the South manufactured forest products in excess of State-wide needs. Florida, Kentucky, Oklahoma, and Texas were not self-sufficient with respect to forest products. That is, these States imported more forest products, in terms of value, than they exported. Consequently, on net balance, their respective forest products industries did not generate new dollars from outside. In North Carolina, the forest products industry accounted for 16.3 percent of economic base employment, or approximately 1 out of 6 basic employees. In two other States—Arkansas and Mississippi—the forest products industry also accounted for approximately 16 percent of the basic employment.



**Industry Composition**

In 1980, North Carolina had more forest products industry employees than did any other Southern State. It had approximately 21 percent of the South's forest products industry employment and 18 percent of total earnings.

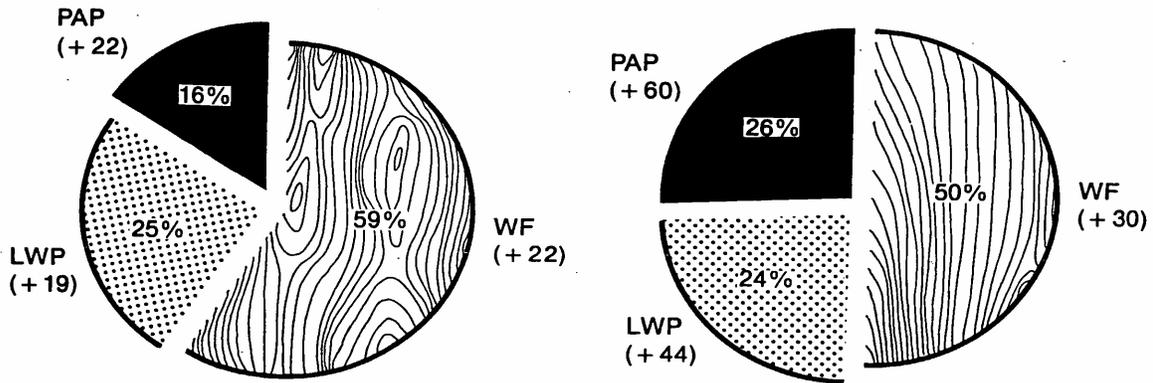
Wood furniture manufacturing accounted for a much larger share of North Carolina's 1980 forest products industry employment and earnings than it did for either the South or the Nation. Wood furniture employment increased much faster in North Carolina between 1970 and 1980 than in either the South or the Nation. The growth of wood furniture earnings in North Carolina greatly exceeded the rate for the South and Nation.

Paper and allied products is a less important segment of the forest products industry in North Carolina than in the South or the Nation. But its growth of employment and earnings was greater for North Carolina than for either the South or the United States. Lumber and wood products also experienced significantly greater growth of employment and earnings during the 1970's than did its counterparts in the South and the Nation.

**NORTH CAROLINA**

1980 Employment—129,287

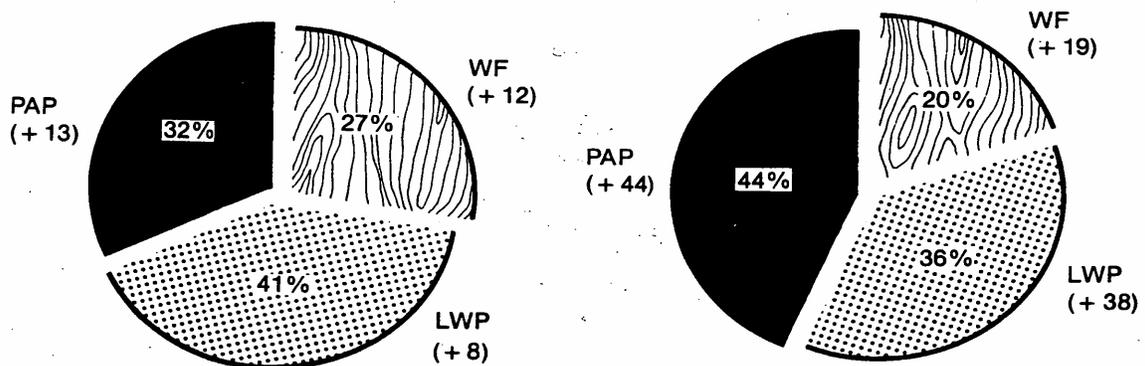
1980 Earnings—\$1,417 million



**THE SOUTH**

1980 Employment—620,567

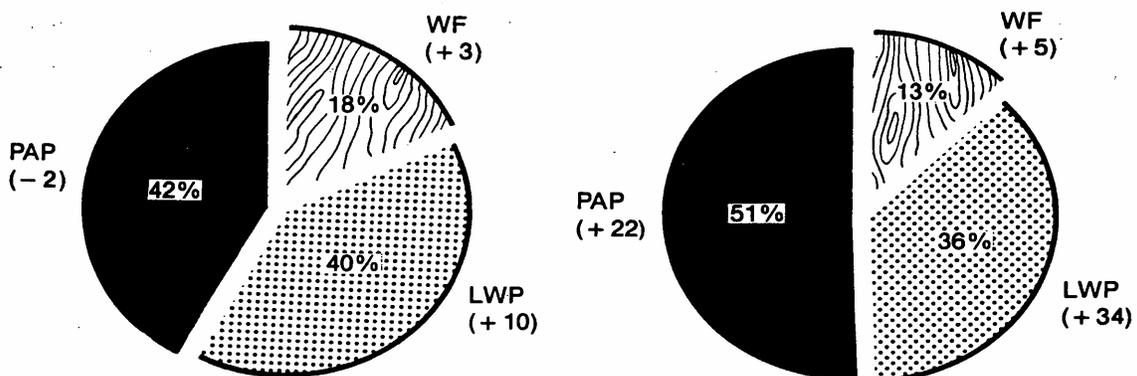
1980 Earnings—\$7.96 billion



**UNITED STATES**

1980 Employment—1,634,000

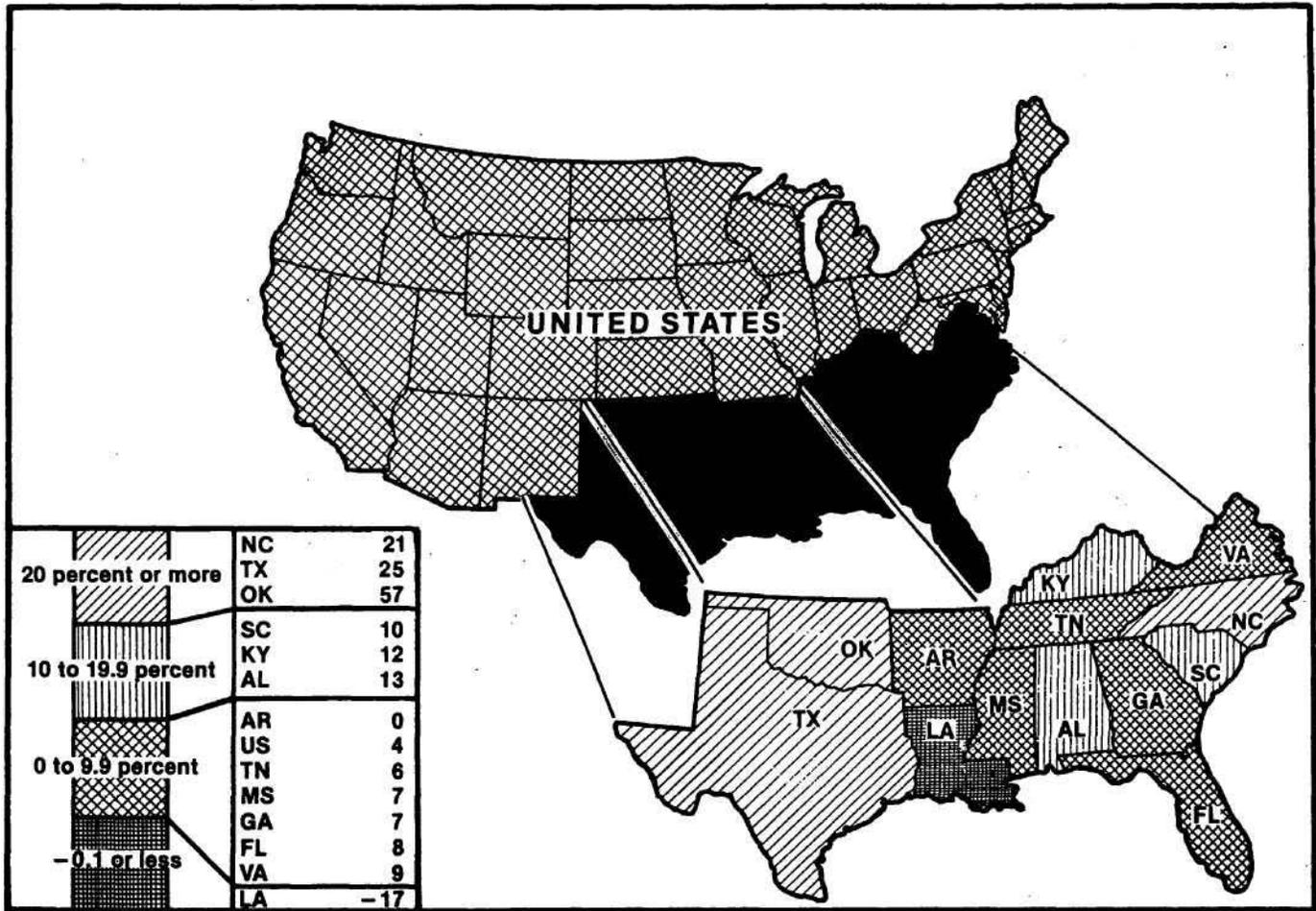
1980 Earnings—\$23.65 billion



Numbers in parentheses show percentage of change from 1970 to 1980. Earnings are expressed in constant 1977 dollars.

**Growth of Employment**

With the exception of Arkansas and Louisiana, forest products industry employment in each of the Southern States grew faster from 1970 to 1980 than did the U.S. counterpart. Employment in two States—Oklahoma and Texas—grew faster than the all-industry average of 22.3 percent. Employment growth in North Carolina's forest products industry was approximately five times the national rate and ranked

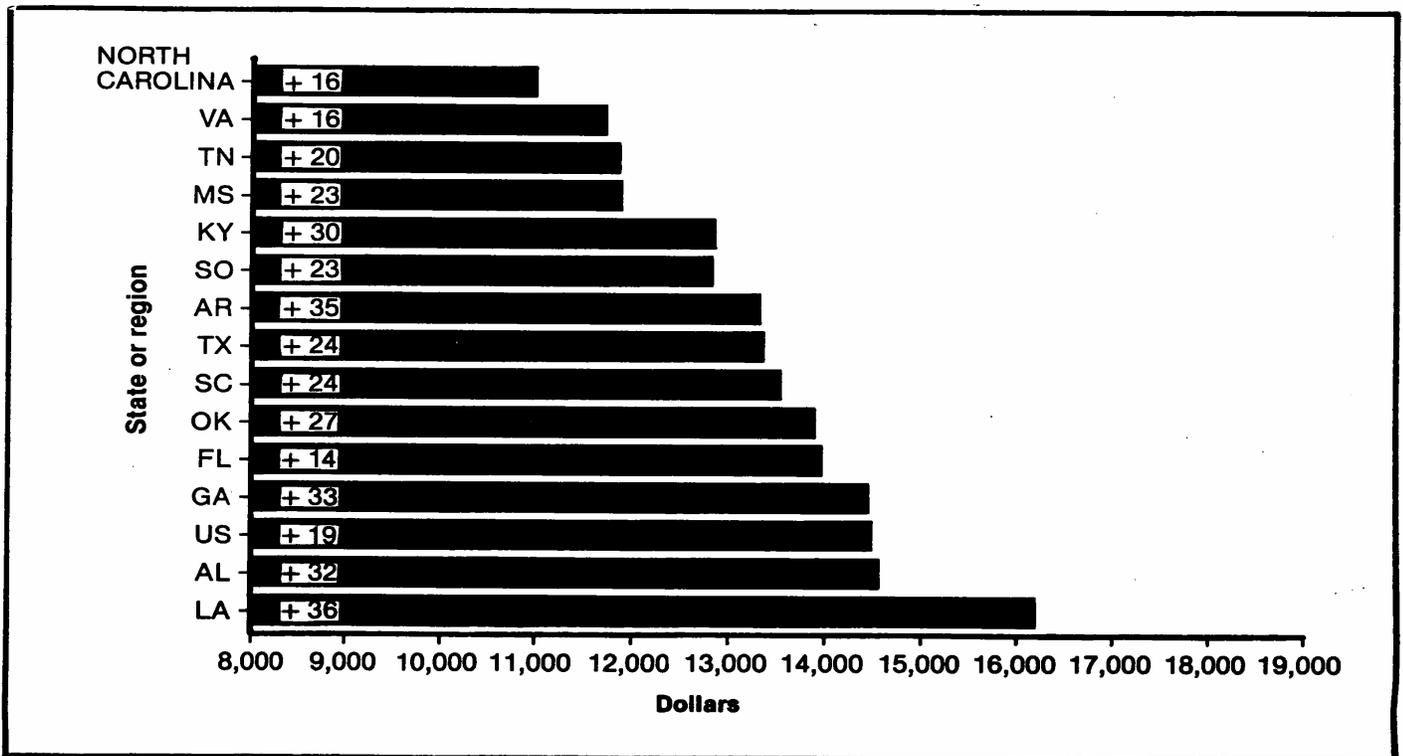


**Average Annual Earnings**

Average annual earnings per worker in the forest products industry differed significantly by State in 1980. Approximately \$5,000 separated the State with the highest—Louisiana—from the State with the lowest—North Carolina. Pulp and allied products manufacturing, which has traditionally paid higher wages than have other segments of the forest products industry, dominated Louisiana's forest products industry. Wood furniture, which has paid lower average wages, dominated North Carolina's forest products industry.

Average annual earnings per worker in North Carolina's forest products industry were nearly one-fourth less than the industry's U.S. average. North Carolina ranked last in the South in average annual earnings per worker, and only Florida experienced slower growth in earnings during the 1970's.

Generally speaking, paper and allied products dominated the forest products industry in the States with the highest average annual earnings. This relationship reflects higher job skills and unions in pulp and paper manufacturing. Wages, by and large, were the lowest in those States where labor-intensive wood furniture manufacturing was more important.



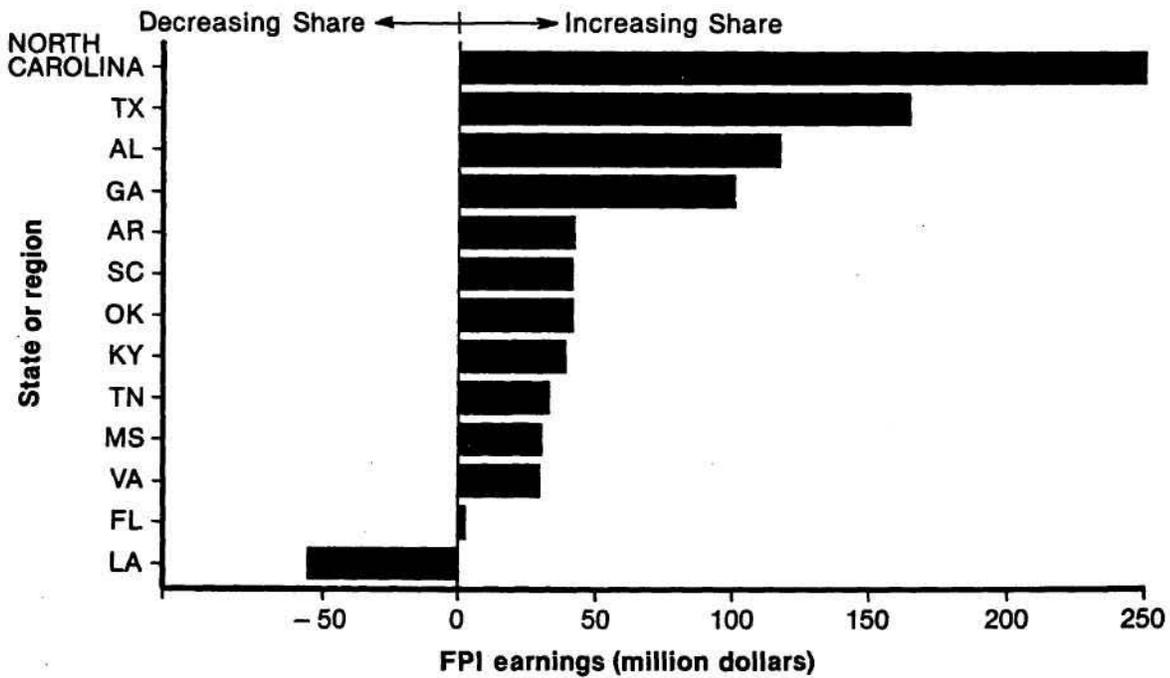
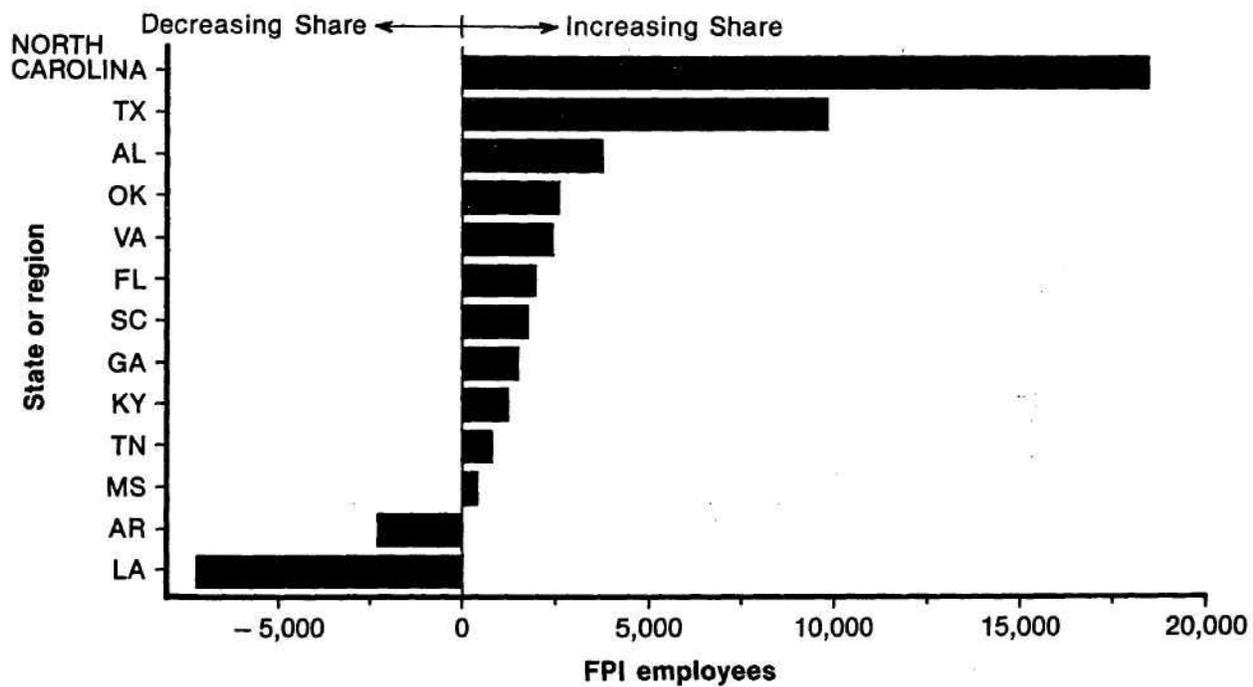
Numbers in bars show percentage of change from 1970 to 1980

**Shift in Employment and Earnings**

The regional shift shows how much more or less employment and earnings a State would have had in the forest products industry in 1980 had it grown at the national rate. For example, North Carolina had approximately 19,500 more employees in 1980 than it would have had if its forest products industry had grown at the national rate.

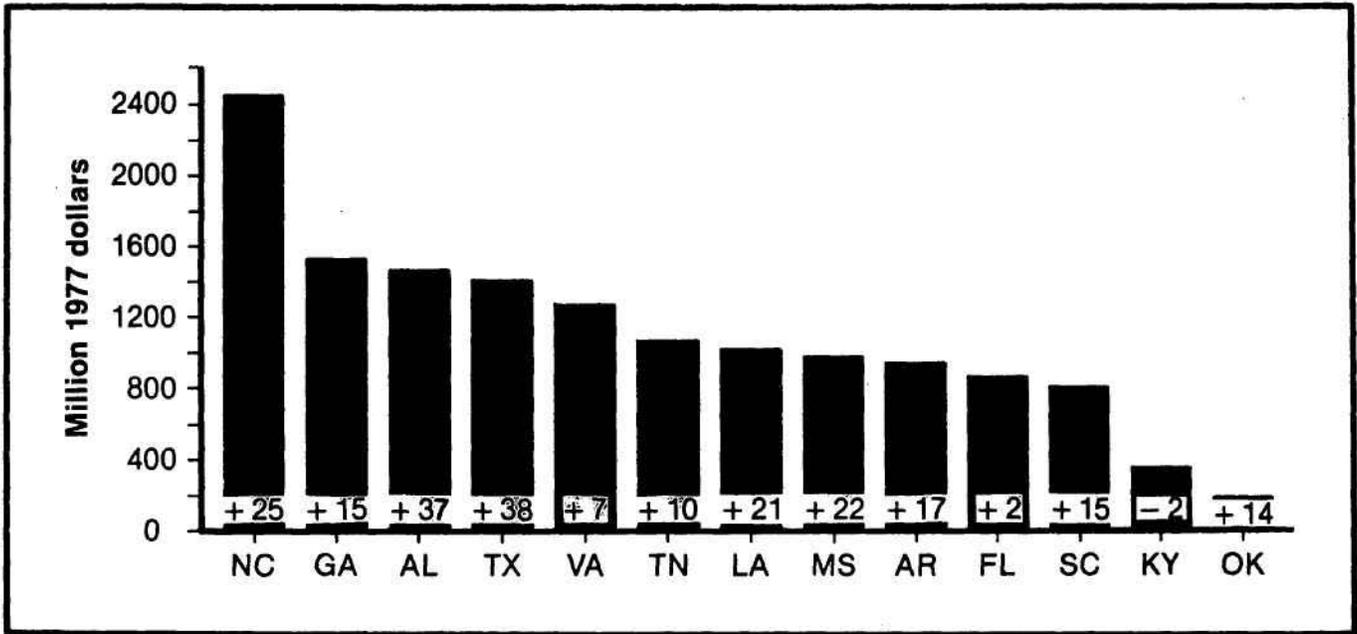
Between 1970 and 1980, employment in the forest products industry increased in every Southern State except Louisiana and Arkansas. Moreover, all but these two States increased their share of the Nation's forest products industry employment, and all but Louisiana increased their share of earnings. North Carolina experienced the largest gain in both employment and earnings of any other Southern State.

Increased shares of employment and earnings reflect the comparative advantage the South's forest products industry enjoyed over this industry in the rest of the Nation. Several factors (for example, relatively lower labor costs, lower raw materials costs, and closer proximity to markets) might account for a region's comparative advantage, although adverse trends with respect to one factor need not reduce a region's advantage. In the case of the South, for instance, increasing labor costs need not adversely affect its comparative advantage if increased capital or labor productivity offsets higher labor costs.



**Value Added by the Forest Products Industry**

In 1977, the forest products industry of North Carolina produced more value added than any other State in the South. Georgia was second among the 13 Southern States, followed by Alabama. Texas was not only one of the leading States in terms of total value added, it also led the South in terms of the change in value added between 1972 and 1977. One State, Kentucky, produced less value added in 1977 than in 1972.

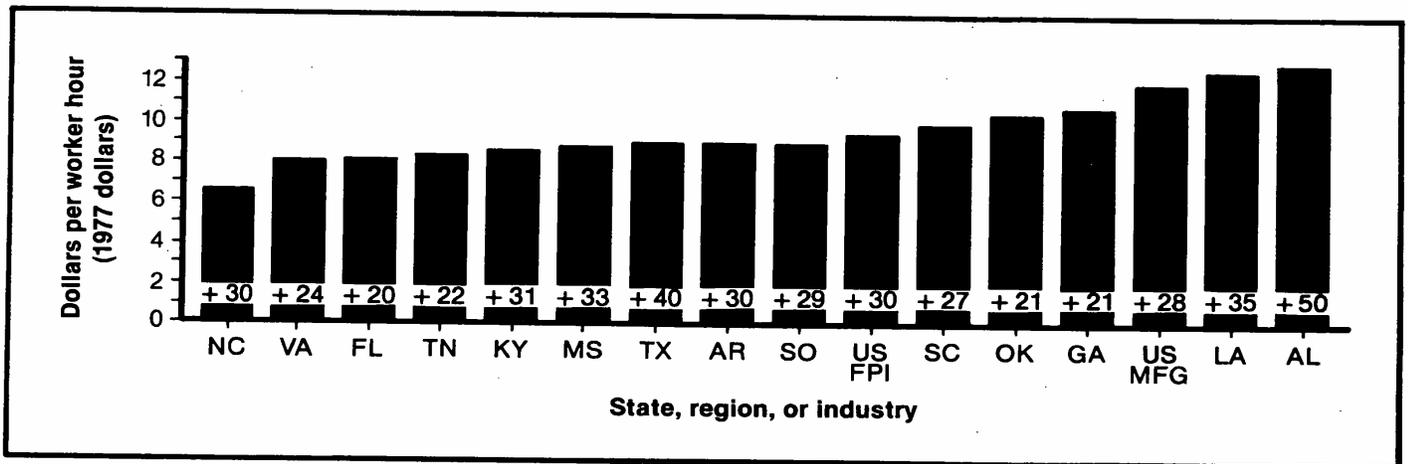


Numbers in bars show percentage of change from 1972 to 1977.

**Capital Productivity**

Paper and allied products, which is more capital-intensive and, therefore, more susceptible to technological change than other segments of the forest products industry, exhibited the highest productivity within the forest products industry. Wood furniture, on the other hand, is the most labor-intensive of the three. North Carolina, for example, produced more value added than any other State in the South, but the productivity of its forest products industry in 1977 was the lowest. This reflects the dominant role of labor-intensive wood furniture manufacturing in North Carolina.

Increases in productivity exceeded increases in payroll per worker between 1972 and 1977 for all the Southern States. This relationship is in part responsible for the South's comparative advantage in the forest products industry. The average productivity for all-manufacturing industries in the Nation exceeded that of the forest products industries in 11 of the 13 Southern States. But the forest products industries in five Southern States exceeded the average productivity for the Nation. Furthermore, the increase in productivity of North Carolina's forest products industry, and that of six other Southern States, exceeded the increase for all of the Nation's manufacturing industries.



Number in bars show percentage of change from 1972 to 1977.

## Acknowledgment

Many helpful suggestions of several reviewers were incorporated in this research paper. This project was partially funded by the USDA Forest Service, Resource Program and Assessment Staff, State and Private Forestry, Area Planning and Development, State Planning for Forest Resources.

## Appendix 1 Tables

**Table 1—Total labor and proprietorial employment and income, by industry, North Carolina, 1980<sup>1/</sup>**

| Industry number        | Industry  | Employees     | Total Income                              |
|------------------------|---|---------------|---|
|                        |   | <i>Number</i> | <i>Thousand 1977 dollars<sup>2/</sup></i> |
| <b>Wage and salary</b> |   |               |   |
| 1                      | Agriculture   | 55,297        | 993,243                                   |
| 2                      | Agricultural services, forestry, and fisheries              | 13,159        | 105,285                                   |
| 3                      | Coal mining   | 0             | 3,062                                     |
| 4                      | Oil and gas extraction                                      | 26            | 693                                       |
| 5                      | Metal mining  | 42            | 184                                       |
| 6                      | Nonmetallic minerals  | 5,097         | 730,44                                    |
| 7                      | Construction  | 119,469       | 1,459,677                                 |
| 8                      | Food and kindred products                                   | 44,975        | 507,442                                   |
| 9                      | Tobacco   | 25,485        | 488,822                                   |
| 10                     | Textile mill production                                     | 248,244       | 2,370,802                                 |
| 11                     | Apparel and other textiles                                  | 88,153        | 625,319                                   |
| 12                     | Paper and allied products <sup>3/</sup>                     | 21,397        | 364,447                                   |
| 13                     | Printing and publishing                                     | 20,634        | 221,474                                   |
| 14                     | Chemical and allied products                                | 39,289        | 606,709                                   |
| 15                     | Petroleum refining  | 692           | 11,229                                    |
| 16                     | Rubber and miscellaneous plastics                           | 23,853        | 308,842                                   |
| 17                     | Leather and leather products                                | 5,060         | 43,453                                    |
| 18                     | Lumber and wood products, except mobile homes <sup>3/</sup> | 31,933        | 339,980                                   |
| 19                     | Mobile homes  | 3,096         | 32,962                                    |
| 20                     | Wood furniture <sup>3/</sup>                                | 75,957        | 712,675                                   |
| 21                     | Other furniture and fixtures                                | 6,602         | 61,944                                    |
| 22                     | Stone, clay, and glass products                             | 18,069        | 230,215                                   |
| 23                     | Primary metals  | 8,508         | 134,459                                   |
| 24                     | Fabricated metals   | 27,340        | 368,611                                   |
| 25                     | Machinery, excluding electrical                             | 48,624        | 723,820                                   |
| 26                     | Electrical machinery  | 55,990        | 774,795                                   |
| 27                     | Transportation equipment except motor vehicles              | 3,279         | 42,311                                    |
| 28                     | Motor vehicles  | 11,444        | 172,036                                   |
| 29                     | Ordnance  | <sup>4/</sup> | <sup>4/</sup>                             |
| 30                     | Instruments and related equipment                           | 10,029        | 143,558                                   |
| 31                     | Miscellaneous manufacturing                                 | 6,474         | 64,116                                    |
| 32                     | Railroad transportation                                     | 7,104         | 144,026                                   |
| 33                     | Trucking and warehousing                                    | 44,366        | 684,908                                   |
| 34                     | Local transit   | 3,690         | 42,578                                    |
| 35                     | Air transportation  | 5,920         | 104,577                                   |
| 36                     | Pipeline transportation                                     | 114           | 2,449                                     |

See footnotes at end of table.

**Table 1—Total labor and proprietorial employment and income, by industry, North Carolina, 1980<sup>1/</sup> (continued)**

| Industry number        | Industry  | Employees        | Total Income                             |
|------------------------|---|------------------|--|
|                        |   | <i>Number</i>    | <i>Million 1977 dollars<sup>2/</sup></i> |
| <b>Wage and salary</b> |   |                  |  |
| 37                     | Transportation services                               | 1,485            | 24,245                                   |
| 38                     | Water transportation                                  | 2,204            | 18,070                                   |
| 39                     | Communications  | 29,217           | 504,578                                  |
| 40                     | Electrical, gas, and sanitation services              | 23,428           | 412,246                                  |
| 41                     | Wholesale trade                                       | 122,102          | 1,716,764                                |
| 42                     | Retail trade  | 352,315          | 2,679,193                                |
| 43                     | Banking   | 29,948           | 328,014                                  |
| 44                     | Other credit agencies                                 | 16,844           | 229,112                                  |
| 45                     | Insurance   | 32,331           | 474,798                                  |
| 46                     | Real estate and combinations                          | 17,553           | 218,837                                  |
| 47                     | Hotel and other lodging                               | 19,028           | 121,588                                  |
| 48                     | Personal, miscellaneous business, and repair services | 77,963           | 774,941                                  |
| 49                     | Auto repair service                                   | 11,794           | 163,082                                  |
| 50                     | Amusement   | 11,217           | 73,668                                   |
| 51                     | Motion pictures                                       | 3,082            | 17,201                                   |
| 52                     | Private households                                    | 66,725           | 172,421                                  |
| 53                     | Medical and other health                              | 83,050           | 1,172,294                                |
| 54                     | Private education                                     | 33,612           | 314,791                                  |
| 55                     | Nonprofit organizations                               | 62,835           | 388,984                                  |
| 56                     | Miscellaneous services                                | 26,447           | 606,727                                  |
| 57                     | Federal civilian                                      | 49,804           | 706,334                                  |
| 58                     | Federal military                                      | 114,704          | 885,868                                  |
| 59                     | State and local government                            | 355,613          | 3,238,818                                |
| <b>Proprietorial</b>   |   |                  |  |
| 60                     | Farm proprietors                                      | 110,361          | 770,234                                  |
| 61                     | Nonfarm proprietors                                   | 181,899          | 1,742,059                                |
|                        | <b>Total</b>  | <b>2,914,972</b> | <b>30,718,614</b>                        |

<sup>1/</sup> Source of data for this table for North Carolina, other States of the South, and the United States: unpublished data, U.S. Department of Commerce, Regional Economics Measurements Division, Regional Economic Information System (REIS), Washington, DC, 1982. Unpublished data used by the U.S. Department of Commerce in preparing their *County Business Patterns* (CBP) series on employment and payroll were used to differentiate wood-related from nonwood-related employment and earnings. For example, CBP data were used to separate mobile homes (no. 19, above) from the lumber and wood products (no. 18) industry. Wood furniture (no. 20) was similarly separated from other furniture and fixtures (no. 21).

<sup>2/</sup> The Personal Consumption Expenditures (CPE) deflator, 1977 = 100, was used to deflate actual dollars.

<sup>3/</sup> The forest products industry is comprised of (1) lumber and wood products (SIC 24), except mobile homes (SIC 2451); and (2) wood furniture manufacturing (SIC 2511, 2512, 2517, 2521, and 2541), and paper and allied products (SIC 26).

<sup>4/</sup> Included with fabricated metals and other related industries.

Table 2—Calculation of 1980 dependency indexes for North Carolina  
(In percent)

| Industry                                       | Employment     |               | North Carolina excess employment <sup>1/</sup> | Dependency index <sup>2/</sup> |
|--|----------------|---------------|--|--------------------------------|
|  | North Carolina | United States |  |                                |
| Agriculture                                    | 2.22           | 1.46          | .76  | 3.64                           |
| Agricultural services, forestry, and fisheries | .53            | .62           |  |                                |
| Farm proprietors                               | 4.43           | 3.03          | 1.40   | 6.72                           |
| Coal mining                                    | 0              | .27           |  |                                |
| Oil and gas extraction                         | 0              | .60           |  |                                |
| Metal mining                                   | 0              | .11           |  |                                |
| Nonmetallic minerals                           | .20            | .14           | .07  | .33                            |
| Construction                                   | 4.79           | 4.74          | .05  | .24                            |
| Food and kindred products                      | 1.80           | 1.87          |  |                                |
| Tobacco  | 1.02           | .07           | .95  | 4.56                           |
| Textile mill production                        | 9.96           | .93           | 9.03   | 43.40                          |
| Apparel and other textiles                     | 3.54           | 1.39          | 2.15   | 10.33                          |
| Paper and allied products                      | .86            | .76           | .10  | .49                            |
| Printing and publishing                        | .83            | 1.37          |  |                                |
| Chemical and allied products                   | 1.58           | 1.22          | .36  | 1.72                           |
| Petroleum refining                             | .03            | .22           |  |                                |
| Rubber and miscellaneous plastics              | .96            | .80           | .16  | .77                            |
| Leather and leather products                   | .20            | .26           |  |                                |
| Lumber and wood products, except mobile homes  | 1.28           | .71           | .57  | 2.75                           |
| Mobile homes                                   | .12            | .05           | .07  | .35                            |
| Wood furniture                                 | 3.05           | .32           | 2.72   | 13.10                          |
| Other furniture and fixtures                   | .26            | .19           | .08  | .37                            |
| Stone, clay, and glass products                | .72            | .73           |  |                                |
| Primary metals                                 | .34            | 1.26          |  |                                |
| Fabricated metals                              | 1.10           | 1.77          |  |                                |
| Machinery, excluding electrical                | 1.95           | 2.73          |  |                                |
| Electrical machinery                           | 2.25           | 2.31          |  |                                |
| Transportation equipment except motor vehicles | .13            | 1.21          |  |                                |
| Motor vehicles                                 | .46            | .87           |  |                                |
| Ordnance                                       | 0              | 0             |  |                                |
| Instruments and related equipment              | .40            | .77           |  |                                |
| Miscellaneous manufacturing                    | .26            | .47           |  |                                |
| Railroad transportation                        | .28            | .58           |  |                                |
| Trucking and warehousing                       | 1.78           | 1.40          | .38  | 1.82                           |
| Local transit                                  | .15            | .29           |  |                                |
| Air transportation                             | .24            | .50           |  |                                |
| Pipeline transportation                        | 0              | .02           |  |                                |
| Transportation services                        | .06            | .22           |  |                                |
| Water transportation                           | .09            | .23           |  |                                |
| Communications                                 | 1.17           | 1.48          |  |                                |
| Electrical, gas, and sanitation services       | .94            | .90           | .04  | .18                            |
| Wholesale trade                                | 4.90           | 5.79          |  |                                |
| Retail trade                                   | 14.13          | 16.50         |  |                                |
| Banking  | 1.20           | 1.72          |  |                                |

See footnotes at end of table.

**Table 2—Calculation of 1980 dependency indexes for North Carolina (continued)**

(In percent)

| Industry  | Employment     |               | North Carolina excess employment <sup>1/</sup> | Dependency index <sup>2/</sup> |
|---|----------------|---------------|--|--------------------------------|
|   | North Carolina | United States |  |                                |
| Other credit agencies                                 |                | .68           | .99  |                                |
| Insurance   |                | 1.30          | 1.89   |                                |
| Real estate and combinations                          |                | .70           | 1.16   |                                |
| Hotel and other lodging                               |                | .76           | 1.20   |                                |
| Personal, miscellaneous business, and repair services |                | 3.13          | 4.69   |                                |
| Auto repair service                                   |                | .47           | .63  |                                |
| Amusement   |                | .45           | .84  |                                |
| Motion pictures                                       |                | .12           | .24  |                                |
| Medical and other                                     |                | 3.33          | 5.71   |                                |
| Private education                                     |                | 1.35          | 1.47   |                                |
| Nonprofit organizations                               |                | 2.52          | 3.01   |                                |
| Miscellaneous services                                |                | 1.06          | 1.63   |                                |
| Federal civilian                                      |                | 2.00          | 3.27   |                                |
| Federal military                                      |                | 4.60          | 2.68   | 1.92                           |
| Nonfarm proprietors                                   |                | 7.30          | 7.66   | 9.24                           |
| <b>Total<sup>3/</sup></b>                             |                | <b>100.00</b> | <b>100.00</b>                                  | <b>20.80</b>                   |

<sup>1/</sup> U.S. employment minus North Carolina employment. Figures may not be exactly equal to North Carolina minus U.S. because of rounding. Dashes signify no excess employment.

<sup>2/</sup> Individual industry excess employment expressed as a percentage of North Carolina's total excess employment (sum of column 4).

<sup>3/</sup> Sum of parts may not equal totals because of rounding.

**Table 3—Value added, hours worked, payroll, and capital productivity,<sup>1/</sup> North Carolina forest products industry, 1977<sup>2/</sup>**

| Industry                  | Value added     | Payroll | Hours worked | Productivity    | Productivity change, 1972-77 |
|---------------------------|-----------------|---------|--------------|-----------------|------------------------------|
|                           | -- \$Million -- |         | Million      | \$VAMP per hour | Percent                      |
| Lumber and wood products  | 539.3           | 228.6   | 48.8         | 5.87            | 26.39                        |
| Wood furniture            | 1,193.4         | 598.9   | 123.7        | 4.80            | 12.14                        |
| Paper and allied products | 715.7           | 267.0   | 31.9         | 14.06           | 64.82                        |

<sup>1/</sup> Productivity equals value added minus payroll (VAMP), divided by hours worked. For a discussion of VAMP, see W. Charles Sawyer and Joseph A. Ziegler. 1980. The use of VAMP shift as a predictive model. Unpublished paper presented at the annual meeting of the Western Regional Science Association, Monterey, California.

<sup>2/</sup> Source: U.S. Bureau of the Census, Census of Manufacturing, for 1972 and 1977, North Carolina and the United States, available in 1976 and 1980, respectively. In the few instances where data were not available for some subindustry components, the distribution of the number of establishments was used to estimate nondisclosures.

**Appendix 2**  
**North Carolina Counties**  
**by Substate Planning**  
**and Development**  
**Districts**

| <b>District<br/>code</b> | <b>Counties</b>   |
|--------------------------|---|
| 1                        | Cherokee, Clay, Graham, Haywood, Jackson, Macon, and Swain  |
| 2                        | Buncombe, Henderson, Madison, and Transylvania  |
| 3                        | Cleveland, McDowell, Polk, and Rutherford   |
| 4                        | Alleghany, Ashe, Avery, Mitchell, Watauga, Wilkes, and Yancey   |
| 5                        | Alexander, Burke, Caldwell, and Catawba   |
| 6                        | Cabarrus, Gaston, Iredell, Lincoln, Mecklenburg, Rowan, Stanly,<br>and Union                              |
| 7                        | Alamance, Caswell, Davidson, Davie, Forsyth, Guilford, Randolph,<br>Rockingham, Stokes, Surry, and Yadkin |
| 8                        | Anson, Montgomery, Moore, and Richmond  |
| 9                        | Chatham, Durham, Johnston, Lee, Orange, and Wake  |
| 10                       | Franklin, Granville, Person, Vance, and Warren  |
| 11                       | Edgecombe, Halifax, Nash, Northampton, and Wilson   |
| 12                       | Cumberland, Harnett, and Sampson  |
| 13                       | Bladen, Hoke, Robeson, and Scotland   |
| 14                       | Brunswick, Columbus, New Hanover, and Pender  |
| 15                       | Carteret, Craven, Duplin, Greene, Jones, Lenoir, Onslow, Pamlico,<br>and Wayne                            |
| 16                       | Beaufort, Bertie, Hertford, Martin, and Pitt  |
| 17                       | Camden, Chowan, Currituck, Dare, Gates, Hyde, Pasquotank,<br>Perquimans, Tyrrell, and Washington.         |

**Schallau, Con H; Maki, Wilbur R.; Foster, Bennett B.; Redmond, Clair H.**  
North Carolina's forest products industry: performance and contribution to the State's economy, 1970 to 1980. Res. Pap. PNW-343. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station; **1985**. 22 p.

Employment and earnings in North Carolina's forest products industry, like those of most Southern States, grew significantly between 1970 and 1980. The forest products industry accounted for a larger share of the State's economic base in 1980 than in 1970. North Carolina had more forest products industry employment than any other State in the South. Moreover, during this period, the State increased its share of the Nation's forest products industry employment and earnings. Pulp and allied products had the highest productivity in 1977 and the largest increase in productivity between 1972 and 1977.

Keywords: Forest products industries, economics (forest products industries), North Carolina.

The **Forest Service** of the U.S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing Nation.

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