1-1-2014

Economic Contributions of Forest-Based Industries in the South

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By

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A Thesis
Submitted to the Faculty of
Mississippi State University
in Partial Fulfillment of the Requirements
for the Degree of Master of Science
in Forestry
in the Department of Forestry

Mississippi State, Mississippi

May 2014

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Pages in Study: 77

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The South is one of the leading timber producing regions in the world. Monitoring economic contribution of the forest products industry in the South over time is thus crucial in addressing critical economic issues and in understanding important industry trends. This study reports the economic impacts for the four forest-based industry (forestry, lumber and wood products, paper and allied products, and wood furniture) for 13 southern states, individually as well as regionally, and compares to 2001, the last comprehensive study of the industry in the South. During the study period, the industry's employment decreased by 33.35% and earnings in real terms decreased by 18.44%. However, value of shipments and manufacturing value-added for the industry in real terms increased by 59.21% and 68.22% respectively. Therefore, despite of disproportionate impacts of the current recession and decline in housing starts, the industry still is an important component of the South's economy.

DEDICATION

I dedicate this thesis to my family for their constant support and encouragement in every step of my life.

ACKNOWLEDGEMENTS

First and foremost, I would like to express my sincere gratitude and appreciation to my research advisers Dr. Ian A. Munn and Dr. James E. Henderson for their invaluable suggestions, guidance, support, and encouragement throughout my Master program. My special gratitude also goes to Dr. Donald L. Grebner and Dr. Meng Zhao for their valuable input and also for serving in my committee.

I am very grateful to the Department of Forestry and and the Forest and Wildlife Research Center at Mississippi State University for providing me a platform to pursue my academic career.

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CHAPTER I

GENERAL INTRODUCTION

1.1 Introduction

Historically, forests provided the source of fuel-wood for energy, products and materials for agricultural activities and construction, and land for settlement. Forests now contribute to economic development creating jobs and incomes. From 1990 to 2010, globally forest cover declined at the rate of -0.17% annually (FAO 2011). No matter how the forest pattern changed (lost, stabilized or recovered); forests have always supported local, state, regional, and national economies and generated employment and earnings. In addition to direct cash benefits, forests also have non-market benefits such as ecosystem services and aesthetic and recreational values.

Forests today provide ranges of consumptive and non-consumptive services and benefits to both public and private interests. Forests provide the raw material needs for the forest products industry. In 2006, the forest products industry employed 13.7 million people and contributed US$468 billion to the global economy (Miner 2010). The forest products industry is an important economic component in many nations. For example, the U.S's forest products industry employed 1.8 million people in 2001 (Tilley and Munn 2007b) and contributed US$108 billion to the national economy in 2006 (FAO 2011). Forestland in the U.S. covers 750 million acres (Alvarez 2007) covering 30.8% of the U.S. land area and 6% of world forest cover (Haynes 2003). The South's forests cover

214 million acres and account for the largest percentage of the U.S. forest land area (Alvarez 2007), and is the largest producer of timber products in the world (Prestemon and Abt 2002).

The regional economic impacts of the forest products industry are larger in the South than Pacific Northwest (Cox and Munn 2001). The South, also known as 'wood basket', accounted for 57% of the U.S. wood harvest in 2006 (Hanson et al. 2010). Given the importance of the forest products industry to the South, economic impacts of this industry have been evaluated with some regularity (e.g., Aruna et al. 1997, Abt et al. 2002, Tilley and Munn 2007a, Hodges et al. 2011, Brandies et al. 2012).

This study, thus, updates the economic contribution of the forest products industry for 13 southern states individually and by region, identifies changes since 2001, and identifies the economic changes between 2001 and 2009 in nominal as well as in real dollars. This study will help bridge the gap in economic information about the industry before and after the economic downturn. In addition, this study will be helpful in identifying important industry shifts and help formulate policies and regulations to support the forest products industry.

1.2 Objectives

- Estimate the economic contribution of the forest-based industry for 13 southern states and the region.
- Determine the economic multipliers for employment, total industry output, income, and value-added.
- Determine the forest-based value of shipments and manufacturing value-added.

- Determine the federal, non-defense taxes and local government, non-education tax impact generated by the forest-based industry.
- Compare and contrast the study results with 2001 results by Tilley and Munn (2007) in nominal and real terms.

1.3 Literature review

1.3.1 Previous studies

Forest-based industry is a major economic contributor to the southern economy. Rising populations and the wide use of wood products for bioenergy, construction activities, housing, paper, and packaging increases the demand for wood products and thus, its contributions to the economy becomes more prominent. Timber production in the South has grown to exceed that of other regions in the U.S. with annual timber harvesting more than double from 1962 to 1996 (Wear et al. 2007). Logging restrictions beginning in 1988 in the Pacific Northwest to conserve the habitat of spotted owl helped shift demand to the South (Powell et al. 1994). Guan and Munn (2000) also suggests capital investment in the wood products sector has shifted to the South. The South supplies 60% of the Nation's timber demand and is also the leading producer of timber in the world (Prestemon and Abt 2002). Thus, the South's market share of the U.S. forest products industry has grown considerably over the end of the 20th century and into the 21st. For instance, the South's share of U.S. wood products jobs increased from 36.5% to 39.3% from 1987 to 1997 (Abt et al. 2002). Forest-based jobs increased from 633,367 in 1992 (Aruna et al. 1997) to 718,176 in 2001 (Tilley and Munn 2007b). As this industry has grown so too has its importance to the regional economy, and a number of studies have attempted to quantify the economic contribution of the forest products industry. Different

techniques were employed to assess the economic impacts of the forest-based industry, including econometric analysis, general equilibrium analysis, and input-output analysis. Input-output analysis is the most popular method as it is easier and more flexible method in estimating the economic impacts and tracking the flow of economy over time.

At the state level, various studies have been conducted to assess the economic impacts of the forest products industry in the South. For instance, Murthy and Cubbage (2004) reported that the gross output of the forest products industry in North Carolina was $13.5 billion employing 105,000 of people. Hodges et al. (2005) estimated that the forest products industry generated total output impacts of $16.63 billion in Florida. Young et al. (2007) also analyzed the economic impact of the forest products industry in Tennessee and reported that the industry generated an economic impact of $21.7 billion creating 184,297 jobs. Dahal et al. (2013) conducted a similar study to assess the impact of forest product industry on the Mississippi economy. The authors reported the forest products industry contributed $10.38 billion of gross output employing 63,365 of people.

However, very few studies have been conducted at the regional level. Tilley and Munn (2007a and 2007b) reported the impact of the forest products industry in the South in 2001. The authors reported that the South's forest-based industry accounted for 39% of employment and 36.5% of earnings of the total U.S. forest-based industry.

Several factors such as industry consolidation and associated changes in land ownership and changes in domestic consumption and trade patterns altered the economy of the South's forest products industry since the late 1990s (Wear et al. 2007) and recently the 2007-2009 global recession and U.S. housing bubble collapse in 2006 resulted in a contraction to the forest products industry in the South. The impacts to the

U.S housing market were particularly severe. For instance, the seasonally annual adjusted rate (SAAR) of U.S. housing starts in 2009 was around 554,000 units, the lowest level in the past 50 years (Woodall et al. 2011). During 2005 to 2009, forestry related sectors across all regions of the U.S. lost over 1.1 million jobs (Woodall et al. 2011). Wood-related industries' (i.e., wood products manufacturing, paper manufacturing, and furniture manufacturing) in the northern region continued to decline since 2001 and the declines were most steep during the 2007-2009 recession loosing 28% of jobs between 2005 and 2010 (Woodall et al. 2011). Similarly, western region lost 31% of forestry related jobs during the same period (Keegan et al. 2011). The South's forest products industry lost around 208,000 jobs during 2005 to 2010 period and the loss was 141,000 higher than that of 2001 to 2005 period (Hodges et al. 2011). Thus, the downturn in the economy severely impacted the U.S. forest products industry.

The previously described economic fluctuations impacting the forest products industry and the increasing market share of that industry that exists within the U.S. South, therefore, magnify the need to assess the economic impacts of the forest-based industry to the South's economy. This study follows Tilley and Munn (2007a and 2007b) and uses input-output models in assessing and updating the economic contributions of the forest products industry for 13 southern states and the region.

1.3.2 Input-output (I-O) Model

The input-output model, developed by Wassily Leontief in 1930s, is a static model based on the idea of inter-industry transactions. The I-O model describes mutual interrelationships among various sectors such as industries, households, and government entities (Leontief 1986, EMSI 2008) and is an important tool to assess economic impacts

due to any exogenous shock (change in consumption, demand, production, and government policies) (Shaffer et al. 2004). For instance, an I-O model can be used to reveal how demand changes affect the overall economic activity in a particular region in terms of employment, income, gross output, value-added, and taxes. I-O models can be used in forecasting and predicting the impact of regional and national policy interaction and changes in inter-industry transactions (Stimson et al. 2002) and is useful in the policy decision making process (Miller et al. 1989).

The basic components of I-O models are the transaction table, direct requirement table, and the total requirement table (Shaffer et al. 2004). The transaction table, a matrix of inter-industry transactions, is the foundation of other two tables (Shaffer et al. 2004) and contains basic information from which an I-O model is developed (Miller and Blair 2009). In this matrix, the monetary flow of goods and services are recorded. The direct requirement table shows input (resources) that a sector requires in producing one dollar of output. The total requirements table, the Leontief inverse, sums the direct and indirect requirements per dollar of output and is used to estimate direct and indirect impacts (multiplier effects) (Miller and Blair 2009 and Shaffer et al. 2004).

I-O models are attractive when data are readily available (e.g., IMPLAN data). However, the usefulness of an I-O model is debatable for underdeveloped countries due to a lack of economic data necessary to construct the I-O table (Eleish 1963). Data for constructing I-O transaction tables are obtained from survey, partial survey, or non-survey methods (Busby 1987). Although the survey method is preferred and gives a detailed and more accurate picture of the economy, it is very expensive and time

consuming (Leatherman and Marcouiller 1999). Therefore, I-O models are commercially constructed from published secondary data (Leatherman and Marcouiller 1999).

1.3.3 IMPLAN

IMpact Analysis for PLANning (IMPLAN), economic impact assessment software, was originally developed by USDA Forest Service and now maintained by Minnesota IMPLAN Group (MIG) (MIG, Inc. 2004). There are two major components of IMPLAN, data and software. IMPLAN generates yearly data and the current version of IMPLAN software is V.3. IMPLAN. IMPLAN is a non-survey based computer software, has been widely used for assessing economic impacts since 1979 (MIG Inc. 2004).

The IMPLAN input-out model provides a quantitative approach in assessing economic impacts (Murthy and Cubbage 2004). For reporting purposes, users can aggregate the different industrial sectors as they desire (Rickman and Schwer 2001). In addition, IMPLAN allows users to incorporate other primary or secondary data (e.g. survey report data) to compute more precise results (e.g. Pickton and Sikorowski 2004, Hussain et al. 2008, Munn et al. 2010). Thus, IMPLAN is a flexible model where users can alter the production function, trade flow model or database (MIG Inc. 2004).The IMPLAN model also can be easily deflated or inflated to different time periods to find the real change in an economy. IMPLAN is now widely accepted and used in different professions.

IMPLAN data are available at county, state, and national level. Different data levels can be combined to generate regional impacts. Impacts are generated by multipliers and economic impacts are estimated in terms of direct, indirect, and induced impacts. Impacts include employment, total industry output, labor income, and value-

added. IMPLAN estimates impacts due to changes in industry activity, employment, income, or any other economic activity.

1.3.4 Multipliers

Economic multipliers illustrate the total impact of an industry that results from spending an additional dollar in the local economy. As industries are interdependent, any change in one sector propagates an impact throughout the economy and multipliers depict these changes. Thus, multipliers can be used to measure interdependence of sectors (Murthy and Cubbage 2004). Multipliers estimate the effect of an exogenous change on employment, earnings, output, and value-added (Miller and Blair 2009). The magnitude of the multiplier effect can be limited by leakages (Schaffer 1999) since with each cycle of respending the value of the initial direct effect will shrink due to savings, taxes , and transfers outside the economy. This continues until the initial direct effect disappears from the local economy. For instance, a multiplier of 1.5 means for every dollar increase in local economy, an additional $0.50 will occur i.e. the total impacts is $1.50. Total impacts (or effects) can be described as direct, indirect, and induced impacts (Miller and Blair 2009).

Direct impacts reflect the magnitude of the industry's own activity, first-round impact. It is the dollar value that circulates throughout the economy. In other word, it measure changes associated with the initial impact to the economy (Perez-Verdin et al. 2008). For instance, expenditures made by the pulp and paper industry as a result of an exogenous event (e.g., increase in demand for their products) is the direct impact and responses in the economy to deliver services and goods to the pulp and paper industry necessary to increase output generate indirect and induced impacts. Indirect impacts refer

to inter-industry spending in response to original industry final demand change. To meet the demands of the pulp and paper industry for goods and services necessary to increase its output, different supporting sectors (forest-owner, logging industry, suppliers, and rail/roadway transport agency) buy equipment, hire workers, supply raw materials, and provide services to the pulp and paper industry and thus, generate the indirect impacts. Induced impacts refer to changes in household spending due to direct and indirect impacts (Shields et al. 1996). Here, the induced impact is the spending made by the employees of the forest products industry and its supporting industries, whose income has been increased because of direct and indirect impacts. Multipliers are thus designed to capture direct, indirect, and induced impacts of the economic activity (Shields et al. 1996). I-O multipliers include Type I, II, III, and Social Accounting Matrix (SAM) multipliers. Type I multipliers are calculated by summing direct and indirect impacts, and dividing by direct impacts. They are the smallest among multipliers as they do not account the induced impacts (household spending). Type II, Type III, and Type SAM multipliers are calculated by summing direct, indirect, and induced impacts, then dividing by direct impacts. They differ in the way the induced impacts are computed. For Type II multipliers, induced impacts are calculated from household expenditures from new labor income. Type II multipliers overestimate the induced impacts (Shields 1996) because it is based on the assumption that there is a linear relationship between expenditure and final demand. In reality, consumer spending increases more slowly than income. Type III multipliers were introduced to correct this problem and there are various methods of computing them. Type III multipliers are more accurate than Type II multipliers. For Type SAM multipliers, induced impacts are based on the information obtained from the

social account matrix (Lindall and Olson 1996). Since SAM multipliers account for social security and income tax leakages, institutional saving, and commuting (Lindall and Olson 1996), it is the preferred multiplier.

IMPLAN assesses the impacts of economic activity which are reported in terms of employment, earnings (labor income), total industry output, and value-added. Employment refers to the total number of full-and part-time jobs. IMPLAN calculates jobs based on average output per employee; therefore, this is total employment needed to support any industry and is a combination of both full and part-time jobs. Earnings are computed by summing employee compensation, proprietary income, and other property type income. Employee compensation is the payroll costs including benefits such as health and life insurance, retirement payments, and any other non-cash compensation (Lindall and Olson 1996). Proprietary income is the payment received by self-employed individuals. Other property type income includes payment for rent, royalties, and dividends (Scott and Olson 1996). Total industry output refers to total value of production. Value-added is the sum of earnings and indirect business taxes (excise, property, and sales taxes, and fees).

The thesis is organized in five chapters. Chapter I is the introductory chapter. Chapter II examines the economic impacts of the forest products industry in the South and details the direct impacts of the forest products industry and the associated SAM multipliers. Chapter III examines the changes in economic contribution of the forest products industry between 2001 and 2009 in nominal as well as real dollars. Chapter IV explores tax impacts of the forest products industry in the U.S. South that details the tax

contribution of the forest products industry. Chapter V presents discussion and conclusions.

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CHAPTER II

ECONOMIC IMPACTS OF THE FOREST PRODUCTS INDUSTRY IN THE SOUTH

2.1 Abstract

The forest products industry is an important component of local, state, regional, and national economies. Thus, assessing its economic contribution is crucial. IMpact analysis for PLANning (IMPLAN), an input-output model, was used to assess the economic contribution of the forest products industry for 13 southern states, individually as well as regionally. Two aspects of economic contribution, direct impacts and associated economic multipliers, were estimated for three primary forest products industry sectors (lumber and wood products, paper and allied products, and wood furniture). Direct impacts illustrate the initial impact to the economy and multipliers illustrate the chain of direct effects to the rest of the economy. The forest products industry proved to be one of the important sources of employment and income in 2009.

2.2 Introduction

In 2006, forest products industry (round wood production, pulp and paper and wood producing) contributed about 1% to the global economy and generated 0.4% of jobs (FAO 2011). In 2007 about 47% of total harvesting was done for industrial purposes (Miner 2010). Thus, forest industries are one of the major contributors to the global economy. The U.S. South is one of the largest producers of timber products in the world

(Prestemon and Abt 2002). Therefore, forest resources are a major economic asset in this region, covering approximately 214 million acres (40%) of the total land area (Alig and Bulter 2004). To quantify the impact of the forest products industry four key statistics can be measured: 1) employment, consisting of the number of full- and part-time jobs; 2) employee compensation in wages and salary payment as well as benefits such as health and life insurance, retirement payment and any other non-cash compensation; 3) output in the form of value of production by industry for a given time period; and 4) value-added, sum of employee compensation, proprietary income, property income and indirect business taxes. Those key statistics influence the region's economy in three ways: direct, indirect, and induced effects. The input-output (IO) model, developed by Wassily Leontief (1936), is one of the best models in assessing the economic impact because it includes the direct, indirect and induced impact on the economy. Minnesota IMPLAN Group (MIG), Inc. of Stillwater, Minnesota uses the classical input-output model to provide a highly accurate model for the user.

The forest products industry is one of the major contributors to employment in rural America (Alvarez 2007). The South's share of wood products sector jobs of the U.S.'s wood products jobs increased from 36.5% to 39.3% during 1987 to 1997 (Abt et al. 2002). Using 1992 IMPLAN data, Aruna et al. (1997) estimated the contribution of forest-based industries to state and regional economies in the South in the early 1990s. Forest-based industries accounted for 633,367 of total employment, $15.5 billion in wage and salary, and $31.6 billion in total manufacturing value added. Tilley and Munn (2007) updated the study using 2000 and 2001 data. The economic impact of forest-based industries in the South had increased substantially from 1990 to 2001. However, no

follow-up has been conducted since then. Given the dramatic changes that have occurred in the economy since 2001, such as the sharp decline in housing starts and its impact on the forest products industry, an updated analysis of the contributions of the forest products industry is necessary to accurately portray the role this industry now plays in the South and its member states.

Forest resources impact the economy at all levels, from wages and purchases in local economies to state-level payroll and income taxes. As there is a multi-level interest in impacts of the forest product industry from local users to politicians, quantifying its impacts on economies of interest is crucial. Two aspects of economic contributions are very important for policy makers, the direct impacts and the economic multipliers. Direct impacts reflect the magnitude of the industry's own economic activity while multipliers capture the magnitude of the domino effect that the direct impacts cause in the rest of the economy. Thus, the purpose of this study was to determine the direct economic contribution of the three major forest products industries: lumber and wood products, paper and allied products, and wood furniture to the 13 southern states and the region, and to determine social accounting matrix (SAM) multiplier by state and region. Results from this research will update baseline economic information about the forest products industry for planners and policy makers and identify important trends in the industry.

2.3 Material and Methods

2.3.1 Input-output Model

Economic impacts of the forest products industry in the South were assessed using IMPLAN, a non-survey-based computer software and modeling system that constructs regional economic accounts and regional input-output tables at flexible spatial

scales (Shaffer et al., 2004; Tilley and Munn, 2007). IMPLAN can be used to depict economic consequences of contributions by specific industries or activities to a specified economy. IMPLAN models, the interconnections between industries, households and the government, tracks the flow of money from sector to sector.

MIG began working on IMPLAN databases in 1987 (MIG 2004) and provides yearly IMPLAN data and software. IMPLAN is now used in various fields to estimate economic impacts of specified economic activities in specified areas, regions or even at the global level.

2.3.2 Specification of Data

IMPLAN 2009 databases, the most recent data available when this study was started, for the 13 southern states were obtained from MIG. For the construction of the model, the 2009 IMPLAN database was used and was measured in 2009 dollars. Tilley and Munn (2007) was consulted for the state and region wise comparison.

2.3.3 Data Analysis

Data were analyzed with IMPLAN V3.0 software using a 440-sector input-output transaction table based on North American Industrial Classification System (NAICS). IMPLAN models were constructed for each of the 13 southern states and the region to generate the direct effects and SAM multipliers. The 13 southern states were Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia. Forest-related industries were aggregated into three broad primary sectors: lumber and wood products, paper and allied products, and wood furniture of the forest products industry (Table 1).

Employment, total and personal income, total output, value added and associated SAM multipliers were derived for each of these sectors. To illustrate the current situation of the forest products industry, economic impacts were measured in nominal value and the changes were computed comparing the study results to Tilley and Munn (2007) in nominal dollars.

2.4 Results

The forest products industry comprised 1.6% of the total economy of the South in 2009. The industry generated 0.8% of total employment, 1.0% of wages and salaries, and 1.0% of value-added for the region. The wood furniture sector accounted for the largest share of employment (35.1%) within the forest products industry, while the paper and allied products sector contributed the lowest, 31.0%. However, the paper and allied products sector accounted for the largest share in wages and salaries (46.7%), total industry output (60.3%) and value-added (53.7%). Of $132.6 billion of the forest products industry output, value-added by the industry represented 32.5%, the largest contributor being wood furniture sector (38.3%) and the smallest being the paper and allied products sector (28.9%). Average annual wages for employees in the industry were $55,600 compared to $47,300 for the South as a whole (Table 2.).

The economic contributions of the forest products industry varied substantially among the 13 states in the region (Table 2). Among 13 States, with respect to the South's forest products industry, North Carolina generated the highest employment (14.7%), wages and salaries (13.1%), and total industry output (12.2%), and Texas had the highest value-added (12.6%) while Oklahoma had the lowest share, 1.5%, 1.5%, 1.7%, and 1.6% of employment, wages and salaries, total industry output and value-added respectively.

Mississippi had the largest percentage of employment (2.4%), wages and salaries (2.9%), and value-added (2.9%), and Arkansas had the largest share in total industry output (4.5%) while Florida shared smallest percentage of employment (0.3%), wages and salaries (0.4%), and value-added (0.4%), and Texas had 0.7% of share to total industry output.

Similarly, economic contribution of the forest products industry also varies considerably among the different sectors. In the lumber and wood products sector, Georgia generated the largest percentage of employment (11.7%), wages and salaries (11.9%), total industry output (11.8%) and second highest value-added (11.5%) to the South, whereas Oklahoma had the lowest share, 1.5%, 1.6%, 1.6%, and 1.6% of employment, wages and salaries, total industry output and value-added respectively. Texas had the highest lumber and wood product value-added of $1.3 billion (12.4%) in the South. Likewise, in the wood furniture sector, North Carolina was the highest economic contributor to the South, accounting for 21.5% of employment, 21.3% of wages and salaries, 21.8% of total industry output, and 22.7% of value-added while Louisiana was the smallest contributor with 1.1%, 1.0%, 1.0%, and 0.9% of employment, wages and salaries, total industry output, and value-added, respectively. In the paper and allied products sector, Georgia was again the highest contributor to employment (13.0%), wages and salaries (13.2%), total industry output (13.7%), and value-added (13.7, whereas Oklahoma was the lowest contributor, 1.8%, 1.7%, 2.0%, and 1.8%, respectively.

SAM multipliers also varied considerably by both state and sector-wide. Regional multipliers for each sector were slightly higher than average state multipliers. Regional

multipliers for employment, total income, and personal income were higher for the paper and allied products sector whereas for total industry output and value-added it is higher for lumber and wood products. For lumber and wood products sector, average state multipliers were 2.53, employment; 2.38, total income; 2.28, personal income; 2.05, output; and 2.49, value-added (Table 3.). For wood furniture sector, average state multipliers were 2.06, employment; 2.06, total income; 1.96, personal income; 1.88, output; and 2.32, value-added (Table 4.). Similarly for the paper and allied products sector, average state multipliers were 3.73, employment; 2.66, total income; 2.58, personal income; 1.76, output; and 2.55, value-added (Table 5.).

2.5 Discussion

As outlined previously, the two important objectives of this study were, to determine the direct economic impact along with the associated SAM multipliers of the three primary forest products industries for 13 southern states and for the region. The findings are completely supportive of our expectations. Our results suggest that the direct economic impacts of the forest products industry are substantial and associated SAM multipliers are considerable.

Comparing study results with 2001 results by Tilley and Munn (2007), the economic contribution of the forest products industry in the South exhibits a decreasing trend. The economic contribution of the forest products industry in the South exhibits a decreasing trend from 2001 to 2009. The industry generated 0.8% of employment, 1.0% of wages and salaries, 1.6% of total industry output, and 1.0% of value-added in 2009, compared to 1.3%, 1.4%, 2.1%, and 1.3% respectively in 2001 (Tilley and Munn 2007). In absolute terms, employment in the forest products industry decreased by 33.9%.

However, total industry output and value-added for the forest products industry increased by 15.1% and 8.6%, respectively in nominal values. In contrast, total industry output and value-added for the South increased by 51.7% and 47.0%, respectively. The forest products industry wages and salaries decreased by 4.9% compared to 39.3% increase for the South but average annual wages for employees increased by 44.0% compared to 32.4% increase for the South as a whole. The forest products industry average annual wages was 17.3% higher than that of the South in 2009.

There was no large shift in the relative standings across 13 southern states between 2001 and 2009. North Carolina maintained the highest position in economic contribution except for value-added. Texas had the highest value-added in 2009 which was ranked third in 2001. Though North Carolina maintained its position throughout, its contribution decreased by 43.8%, 15.3%, and 2.4% in employment, wages and salaries, and total industry output, respectively, however; value-added for Texas increased by 17.0%. Similarly, Oklahoma had the smallest percentage share of the South. South Carolina was seen to be least affected by economic contraction through 2009. Mississippi had the largest percentage of employment, 2.4%, whereas Florida had the smallest, 0.3%, in 2009. These two states remained at the upper and lower end, respectively since 2001. This reveals that the economic contribution of the forest products industry is inversely related with the overall size of the state economy.

The economic contribution of lumber and wood products sector declined sharply compared to other forest products sectors. Its employment, wages and salaries, total industry output and value-added decreased by 37.3%, 13.0%, 21.6%, and 12.8%, respectively from 2001 to 2009. Although paper and allied products sector employment

decreased by 26.0%, wages and salaries, total industry output, and value added increased by 3.2%, 42.7%, and 27.0%, respectively. In the lumber and wood products sector, North Carolina was the highest employment generator with highest total industry output in 2001 but went down to third position in 2009, and was replaced by Georgia. State-wide comparisons in other two sectors remained relatively unchanged.

Although the direct impacts of the industry decreased as a share of the total economy of the South, some of this decrease was offset by increases in the multipliers. Compared with 2001, the average state multipliers for all sectors of the forest products industry were higher in 2009. Within the three forest products sectors, average state multipliers for employment, total income and personal income were greatest for the paper and allied products sector while average state multipliers for output and value-added were greatest for the lumber and wood products sector.

2.6 Conclusion

The recent economic recession and sharp decline residential construction were the major factors that adversely affected the forest products industry and thus its economic contribution retreated from 2001. In spite of low representation and decrease in its impacts, economic contribution to regional economies is still significant. The multiplier reflects indirect and induced effects on the rest of the economy, and multipliers with a larger value will generate larger indirect and induced effects than smaller multipliers. However, multipliers may increase or decrease when a new industry enters or when an old industry exits from the economy; therefore, multipliers should be evaluated periodically. In comparison to Tilley and Munn (2007), SAM multipliers are increasing. This indicates that although the direct impacts of the forest products industry decreased,

its relative impact to rest of the economy have increased. Also the average annual wages of employees for the forest products sector were higher in comparison to the South as a whole. Thus, the forest products industry is still making an eminent role in economic growth of the South.

Results showed that the forest products industry is an important contributor to the South's economy. Study and documentation of the impact of the forest products industry on regional economies can provide important guidelines to formulate plans and policies in order to promote the forest products industry. Findings of this study reveal that the forest products industry can be one of the important sources of employment and income in the South. Thus, tracking the economic contribution of the forest products industry over time is very crucial. Time series analysis and documentation of economic data are helpful in addressing critical economic issues and in understanding important trends in the industry.

Table 2.1 IMPLAN sectors included in the aggregated forest products sector.

Aggregated forest products sectors	IMPLAN sectors (NAICS code*) contained in the aggregated sector
Lumber and wood products	Logging (1133); sawmills and wood preservation (3211); veneer and plywood manufacturing (321211, 321212); engineered wood members and truss manufacturing (321213, 321214); reconstituted wood products manufacturing (321219); wood container and pallet manufacturing (32192); prefabricated wood building manufacturing (321992); all other miscellaneous wood product manufacturing (321999)
Paper and allied products	Pulp mills (32211); paper mills (32212); paperboard mills (32213); paperboard container manufacturing (32221); coated and laminated paper, packaging paper manufacturing (322222, 322221); all other paper bag and coated and treated paper manufacturing (322223, 322226, 322224, 322225); stationary product manufacturing (32223); sanitary paper product manufacturing (322291); all other converted paper product manufacturing (322299)
Wood furniture	Wood windows and door and millwork manufacturing (32191), wood kitchen cabinet and counter top manufacturing (33711); upholstered household furniture manufacturing (337121); non-upholstered wood household furniture manufacturing (337122); institutional furniture manufacturing (337127); wood TV , radio and sewing machine housing (337129); wood office furniture manufacturing (337211); custom architectural woodwork and millwork (337212, 337214); showcase, partitions, shelving and lockers (337215)

*Numbers in the parenthesis are North American Classification System (NAICS) codes.

Table 2.2 Economic contribution of the forest products industry (FPI) in the South (2009).

State	Forest products sector	Employment		Wages and salaries ($MM)		Total industry output ($MM)		Total value-added ($MM)	
		2009	2001*	2009	2001*	2009	2001*	2009	2001*
Alabama	Lumber and wood products	15,347	25,467	715.7	854.9	2,673.8	3,883.2	965.0	1,305.1
	Wood furniture	11,183	14,530	454.8	417.5	1,630.0	1,300.3	596.2	562.1
	Paper and allied products	12,447	16,356	1,254.7	1,116.2	8,417.1	6,098.4	2,550.0	2,109.8
	Total	38,977	56,353	2,425.2	2,388.6	12,720.9	11,281.9	4,111.3	3,977.0
	State total	2,483,858	2,421,223	108,135.9	78,499.5	335,134.8	225,575.4	168,773.2	119,442.1
	% to the South's FPI	8.3	7.9	9.3	8.7	9.6	9.8	9.5	10.0
Arkansas	Lumber and wood products	12,912	20,362	544.0	611.4	2,234.6	2,882.1	757.8	899.3
	Wood furniture	6,673	9,926	283.8	275.3	1,085.9	927.7	408.5	381.9
	Paper and allied products	10,352	13,479	761.1	1,522.7	5,827.0	3,660.1	1,568.7	1,212.9
	Total	29,937	43,767	1,588.9	2,409.4	9,147.5	7,469.9	2,735.0	2,494.1
	State total	1,536,622	1,517,570	63,562.6	43,792.9	203,954.9	136,607.1	98,124.8	66,854.6
	% to the South's FPI	6.4	6.1	6.1	8.8	6.9	6.5	6.4	6.3
Florida	Lumber and wood products	10,778	17,077	419.7	548.5	1,628.0	2,134.5	583.9	775.4
	Wood furniture	11,787	19,008	512.5	556.5	1,771.7	1,685.7	680.7	744.9
	Paper and allied products	9,282	11,614	768.2	634.5	5,142.3	3,091.9	1,526.0	945.3
	Total	31,847	47,699	1,700.5	1,739.5	8,541.9	6,912.1	2,790.6	2,465.6
	State total	9,725,755	9,172,732	437,720.2	315,613.9	1,180,813.0	810,441.3	712,243.3	491,198.8
	% to the South's FPI	6.8	6.7	6.5	6.3	6.4	6.0	6.5	6.2
Georgia	Lumber and wood products	18,614	26,761	844.4	933.3	3,234.5	3,865.9	1,186.7	1,370.8
	Wood furniture	12,159	16,144	523.7	478.1	1,917.2	1,557.1	743.7	639.9
	Paper and allied products	18,956	27,910	1,614.0	1,624.6	10,947.3	7,960.2	3,166.0	2,676.9
	Total	49,729	70,815	2,982.1	3,036.0	16,098.9	13,383.2	5,096.4	4,687.6
	State total	5,238,732	4,964,658	253,277.4	194,681.8	724,192.9	525,771.1	412,686.9	307,932.2
	% to the South's FPI	10.6	9.9	11.4	11.1	12.1	11.6	11.8	11.8
Kentucky	Lumber and wood products	8,059	16,047	304.6	407.0	1,313.4	1,892.2	455.2	531.0
	Wood furniture	7,808	8,415	310.7	265.3	1,191.2	790.0	430.8	362.6
	Paper and allied products	9,146	10,616	638.4	526.7	4,119.3	2,515.1	1,102.8	804.0
	Total	25,012	35,078	1,253.7	1,199.0	6,623.9	5,197.3	1,988.9	1,697.6
	State total	2,320,324	2,327,652	99,822.9	74,231.6	316,540.4	227,294.8	159,083.9	113,884.7
	% to the South's FPI	5.3	4.9	4.8	4.4	5.0	4.5	4.6	4.3
Louisiana	Lumber and wood products	9,930	13,544	513.2	473.6	1,791.4	2,066.7	739.1	719.2
	Wood furniture	1,790	1,732	67.5	37.3	249.6	127.1	88.4	49.7
	Paper and allied products	7,059	10,542	667.6	629.0	4,252.5	3,413.8	1,274.7	1,117.1
	Total	18,778	25,818	1,248.3	1,139.9	6,293.5	5,607.6	2,102.2	1,886.0
	State total	2,492,614	2,502,534	115,645.6	80,588.3	426,401.1	245,162.2	188,445.9	122,582.8
	% to the South's FPI	4.0	3.6	4.8	4.1	4.7	4.9	4.9	4.8
Mississippi	Lumber and wood products	13,850	21,748	617.3	684.7	2,442.9	3,285.6	909.2	1,073.1
	Wood furniture	18,060	27,121	705.0	796.0	2,711.3	2,487.1	1,041.7	875.5
	Paper and allied products	4,252	7,762	360.5	453.6	2,380.8	2,401.9	702.9	764.6
	Total	36,161	56,631	1,682.8	1,934.3	7,534.9	8,174.6	2,653.8	2,713.2
	State total	1,484,021	1,481,891	58,619.6	42,089.9	190,371.0	124,669.6	91,220.4	63,204.2
	% to the South's FPI	7.7	8.0	6.4	7.0	5.7	7.1	6.2	6.8

Table 2.2 (continued)

North Carolina	Lumber and wood products	17,349	29,921	746.1	944.2	2,944.6	4,236.2	1,119.8	1,365.1
	Wood furniture	35,458	71,997	1,458.3	2,034.7	5,465.6	6,571.7	2,190.5	2,494.5
	Paper and allied products	16,417	21,148	1,220.8	1,066.4	7,787.4	5,781.8	2,045.4	1,684.1
	Total	69,224	123,066	3,425.1	4,045.3	16,197.5	16,589.7	5,355.7	5,543.7
	State total	5,178,695	4,924,710	236,488.2	170,379.6	688,173.5	480,296.9	376,667.6	260,284.5
	% to the South's FPI	14.7	17.3	13.1	14.7	12.2	14.4	12.4	14.0
Oklahoma	Lumber and wood products	2,449	4,265	115.2	134.4	432.2	589.2	164.2	185.0
	Wood furniture	2,054	3,753	80.3	96.5	289.4	324.8	99.9	129.9
	Paper and allied products	2,667	2,930	202.3	136.1	1,588.1	746.0	409.7	229.6
	Total	7,170	10,948	397.8	367.0	2,309.7	1,660.0	673.9	544.5
	State total	2,117,525	2,064,469	92,442.3	63,086.8	292,464.5	190,277.3	156,450.7	97,844.0
	% to the South's FPI	1.5	1.5	1.5	1.3	1.7	1.4	1.6	1.4
South Carolina	Lumber and wood products	10,429	13,121	491.6	462.1	1,915.0	1,997.7	759.1	671.4
	Wood furniture	3,806	6,129	150.9	174.8	541.5	562.9	189.3	229.9
	Paper and allied products	12,724	14,736	1,091.6	879.1	7,302.7	4,245.0	2,158.9	1,441.8
	Total	26,959	33,986	1,734.1	1,516.0	9,759.2	6,805.6	3,107.4	2,343.1
	State total	2,421,264	2,280,026	100,262.0	73,015.3	298,493.1	206,423.4	159,593.2	111,346.6
	% to the South's FPI	5.7	4.8	6.6	5.5	7.4	5.9	7.2	5.9
Tennessee	Lumber and wood products	9,589	17,172	411.3	497.2	1,582.4	2,108.8	562.7	640.2
	Wood furniture	13,250	23,762	521.3	690.3	1,990.1	2,325.6	728.3	910.5
	Paper and allied products	15,743	20,573	1,382.9	1,146.4	8,549.2	5,930.2	2,605.9	1,930.0
	Total	38,582	61,507	2,315.5	2,333.9	12,121.7	10,364.6	3,896.9	3,480.7
	State total	3,525,365	3,472,042	158,481.8	117,512.4	485,454.6	341,800.9	253,022.7	183,692.3
	% to the South's FPI	8.2	8.6	8.9	8.5	9.1	9.0	9.1	8.8
Texas	Lumber and wood products	17,758	28,435	817.0	955.5	3,104.2	3,179.4	1,277.1	1,327.7
	Wood furniture	26,031	32,058	1,122.9	949.6	4,030.9	2,955.7	1,535.6	1,277.3
	Paper and allied products	17,635	26,004	1,473.6	1,327.9	8,652.0	6,239.1	2,627.9	2,044.4
	Total	61,424	86,497	3,413.4	3,233.0	15,787.1	12,374.2	5,440.6	4,649.4
	State total	13,880,603	12,638,113	713,492.6	504,759.2	2,358,272.3	1,421,497.7	1,224,308.2	790,807.3
	% to the South's FPI	13.1	12.1	13.1	11.8	11.9	10.7	12.6	11.7
Virginia	Lumber and wood products	12,627	20,696	555.1	646.0	2,216.0	2,980.0	804.1	928.5
	Wood furniture	14,914	25,914	652.9	731.5	2,254.7	2,478.8	901.2	991.4
	Paper and allied products	9,109	13,367	762.5	753.2	5,025.6	3,980.7	1,396.8	1,261.1
	Total	36,649	59,977	1,970.5	2,130.7	9,496.3	9,439.5	3,102.1	3,181.0
	State total	4,738,106	4,523,325	267,684.4	183,930.6	656,126.0	441,841.0	407,306.4	269,407.9
	% to the South's FPI	7.8	8.4	7.5	7.8	7.2	8.2	7.2	8.0
South	Lumber and wood products	159,690	254,616	7,095.3	8,152.8	27,512.8	35,101.5	10,284.1	11,791.8
	Wood furniture	164,972	260,489	6,844.6	7,503.4	25,129.2	24,094.5	9,634.8	9,650.1
	Paper and allied products	145,788	197,037	12,198.1	11,816.4	79,991.1	56,064.2	23,135.9	18,221.6
	Total	470,449	712,142	26,138.0	27,472.6	132,633.2	115,260.2	43,054.8	39,663.5
	South total	57,143,482	54,290,945	2,705,635.5	1,942,181.8	8,156,392.1	5,377,658.7	4,407,927.2	2,998,482.0

* Tilley and Munn 2007

Table 2.3 SAM multiplier for the lumber and wood products industry in the southern United States by states.

State	Employment		Wages and salaries		Personal income		Total industry output		Total value-added	
	2009	2001*	2009	2001*	2009	2001*	2009	2001*	2009	2001*
Alabama	2.5043	2.2138	2.2852	2.1106	2.2540	2.1513	1.9781	1.8437	2.4511	2.1873
Arkansas	2.4784	2.2204	2.3101	2.1427	2.1576	2.1256	1.9459	1.8548	2.4114	2.2401
Florida	3.1281	1.9852	3.0253	2.0170	2.9442	1.9908	2.5587	1.7685	3.2973	2.1581
Georgia	2.6796	2.1630	2.6114	2.2080	2.4764	2.1639	2.2210	1.9131	2.8130	2.3463
Kentucky	2.2596	1.9924	2.0871	2.1153	1.9401	2.1007	1.8295	1.8214	2.1249	2.3314
Louisiana	2.5567	2.2000	2.2246	2.0481	2.1640	2.0501	2.0341	1.8109	2.3052	2.1191
Mississippi	2.4923	2.1752	2.2469	2.0748	2.0925	2.0735	1.9374	1.8044	2.2663	2.1125
North Carolina	2.4781	2.1574	2.3719	2.1671	2.2575	2.1424	2.0189	1.8595	2.4049	2.2986
Oklahoma	2.2946	2.1849	1.9947	2.0584	1.8481	2.0341	1.8452	1.8084	2.1430	2.2416
South Carolina	2.6108	2.1131	2.2519	2.0471	2.1579	2.0256	1.9389	1.7769	2.2466	2.0995
Tennessee	2.5364	2.0765	2.6059	2.1962	2.7573	2.2133	2.1670	1.8980	2.8248	2.4740
Texas	2.6797	1.9743	2.6180	2.0471	2.4471	2.0148	2.2993	1.8290	2.6873	2.2284
Virginia	2.2194	1.9960	2.2594	2.0746	2.1873	2.0688	1.8948	1.7601	2.3494	2.2079
Mean	2.5322	2.1117	2.3764	2.1005	2.2834	2.0888	2.0515	1.8268	2.4865	2.2342
South	2.5548	NA	2.412	NA	2.3091	NA	2.0726	NA	2.5141	NA

* Tilley and Munn 2007

Table 2.4 SAM multiplier for the wood furniture industry in the southern United States by states.

State	Employment		Wages and salaries		Personal income		Total industry output		Total value-added	
	2009	2001*	2009	2001*	2009	2001*	2009	2001*	2009	2001*
Alabama	2.0485	1.6778	1.9939	1.7109	1.8979	1.6611	1.8524	1.7495	2.2736	1.8688
Arkansas	1.9455	1.7380	1.8744	1.7444	1.7887	1.6635	1.7031	1.7459	2.0051	1.8725
Florida	2.4836	1.6999	2.4721	1.8221	2.3699	1.7658	2.2532	1.7744	2.9022	2.0004
Georgia	2.2651	1.7699	2.3085	1.9763	2.1653	1.9032	2.0615	1.8916	2.5762	2.1857
Kentucky	1.9594	1.6962	1.9144	1.6522	1.8464	1.6758	1.7494	1.7095	2.0912	1.7686
Louisiana	1.9396	1.5513	2.0230	1.7714	1.9320	1.7311	1.8262	1.7192	2.2959	1.9450
Mississippi	1.7350	1.7399	1.6892	1.7197	1.6124	1.6473	1.5634	1.7832	1.7897	2.0653
North Carolina	2.0476	1.7624	2.0494	1.8789	1.9812	1.8130	1.8499	1.8580	2.1798	2.1627
Oklahoma	1.8836	1.7145	1.8819	1.7902	1.7790	1.6941	1.7445	1.7553	2.2198	1.9644
South Carolina	2.1032	1.6759	2.0397	1.7243	1.9383	1.6632	1.8936	1.7387	2.4230	1.9125
Tennessee	2.0684	1.8318	2.1757	1.9529	2.0332	1.8507	1.9048	1.8720	2.3993	2.1693
Texas	2.3345	1.6809	2.4173	1.8515	2.2648	1.7434	2.2233	1.8212	2.8004	2.0451
Virginia	1.9276	1.6790	2.0020	1.8279	1.9212	1.7645	1.8592	1.7495	2.2386	1.9907
Mean	2.0570	1.7090	2.0647	1.8017	1.9639	1.7367	1.8834	1.7822	2.3227	1.9962
South	2.0863	NA	2.1095	NA	2.0066	NA	1.9170	NA	2.3407	NA

* Tilley and Munn 2007

Table 2.5 SAM multipliers for the paper and allied products industry in the southern United States by states.

State	Employment		Wages and salaries		Personal income		Total industry output		Total value-added	
	2009	2001*	2009	2001*	2009	2001*	2009	2001*	2009	2001*
Alabama	4.8988	2.8676	2.6089	1.8607	2.5635	1.7781	1.7586	1.5160	2.3211	1.7655
Arkansas	3.5409	2.4840	2.4651	1.8200	2.2786	1.7180	1.6092	1.5311	2.1845	1.7938
Florida	5.0702	2.6469	3.2193	2.0834	3.2064	2.0029	2.0080	1.6323	2.9165	2.1809
Georgia	4.6027	2.6149	3.0010	2.0749	2.8376	1.9680	1.9044	1.6501	2.7585	2.0877
Kentucky	2.9339	2.2301	2.1489	1.7844	2.0382	1.7124	1.5694	1.5288	2.1156	1.8425
Louisiana	4.1540	2.7529	2.4782	1.9231	2.3175	1.8172	1.7596	1.5479	2.2910	1.8582
Mississippi	3.4942	2.5496	2.1528	1.7856	2.1047	1.6938	1.5614	1.5031	1.9946	1.7738
North Carolina	3.6345	2.5154	2.5418	2.0246	2.4623	1.9496	1.7367	1.5842	2.5569	2.0699
Oklahoma	3.8831	2.5540	2.6395	2.0173	2.4067	1.8425	1.6830	1.5983	2.4345	2.0130
South Carolina	4.0216	2.4188	2.4025	1.7460	2.2774	1.6754	1.6583	1.4983	2.2243	1.7698
Tennessee	4.2910	2.6572	2.7340	2.0312	2.4804	1.8880	1.8531	1.6047	2.5245	2.0137
Texas	4.0876	2.3580	2.8231	2.0570	2.8806	1.9007	2.0261	1.6885	2.8239	2.1580
Virginia	3.7278	2.4903	2.6635	1.9704	2.5757	1.9372	1.7613	1.5515	2.5536	1.9535
Mean	4.0262	2.5492	2.6060	1.9368	2.4946	1.8372	1.7607	1.5719	2.4384	1.9446
South	4.0985	NA	2.6631	NA	2.5491	NA	1.7939	NA	2.4961	NA

* Tilley and Munn 2007

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CHAPTER III

2009 ECONOMIC IMPACTS OF FOREST-BASED INDUSTRIES IN THE SOUTH AND CHANGES SINCE 2001

3.1 Abstract

Study and documentation of economic impacts of the forest-based industry provide important guidelines to formulate plans and policies to promote forest-based sectors. This study reports the estimated economic impacts of the forest products industry in the South, and compares and contrasts these with the last comprehensive study of the industry. The IMpact analysis for PLANning (IMPLAN) model was used to assess the economic contributions of the forest-based industry in the South, regionally and for the individual states within the region. The forest-based industry proved to be an important component of the South's economy; however, it was greatly affected by the recent recession and downturn in the housing market. This study updates baseline economic information for the forest-based industry and provides a crucial update of that economic information.

3.2 Introduction

The United States, with only 7.67% of the world's total forest land, (Alvarez 2007), accounted for 23.2% of the global forest products industry economy in 2006 (FAO 2011). The South's forest land, which represents only 2.2% of world's forest area, is the

world's leading industrial wood producing region (Prestemon and Abt 2002), and the major regional contributor to the global forest economy (Hodges et al. 2011). Timber production was forecasted to increase by about one third from 1995 to 2040, and the South was considered to be the major contributor of this growth (Wear and Greis 2002). The South's forest-based industry accounted for about 40% of employment in the U.S forest-based industry (Tilley and Munn 2007b). Thus, forest resources are major economic assets not only of the southern U.S. but also of the global economy.

In 1982, the South generated the most forest-based industrial output in the U.S. (Teeter 1989) compared to other forested regions. In 1992, the forest-based industry accounted for 633,367 jobs in the South (Aruna et al. 1997). This increased to 771,392 jobs in 1997 (Abt et al. 2002) before declining to 718,176 in 2001 (Tilley and Munn 2007b), the forest-based industry's employment increased from 1992 to 2001. Nonetheless, the South's forest-based industry was a stable economic contributor during this period. The abrupt decline of housing starts in 2006 and recession from 2007 to 2009 substantially affected the forest-based economy throughout the U.S. Over 500 mills closed in the South since 2005 with high associated job losses (Woodall et al. 2011). Given the importance of the forest-based industry, the striking economic downturn in recent years, and the extended time period since the last comprehensive study of the economic contributions of the forest-based industry in the South in 2001 (Tilley and Munn 2007a, Tilley and Munn 2007b), an update is necessary.

The purpose of this study is to determine the economic contribution of forest-based industries for 13 southern states and for the region, and to compare the study results with the last comprehensive study done by Tilley and Munn (2007a, 2007b). This

study will update the economic information pertaining to the forest-based industry and will identify important shifts in the industry. Documenting changes in economic contributions of forest-based industries helps to determine when or if legislative action in needed to support this industry that is so important to rural economies. Thus, this study provides crucial information to elected officials and other policy makers.

3.3 Methods

Economic statistics for the 2009 forest-based industry were computed for 13 southern states and the region as a whole using IMPLAN V.3 software and data maintained by the Minnesota IMPLAN Group (MIG). The 13 southern states included in the study were Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia. Results were compared to 2001 results (Tilley and Munn 2007a, Tilley and Munn 2007b) to illustrate industry changes over time. Economic comparisons of the forest-based industries were made between 2001 and 2009 for 13 southern United States. The bases for comparison were forest-based employment, earnings, value of shipments, and manufacturing value-added. To account for inflation, 2009 dollar values were deflated to 2001 values using IMPLAN deflators in the 2009 database. Comparisons were made both in nominal as well as real terms.

IMPLAN, originally developed by USDA in cooperation to Federal Emergency Management Agency and USDI Bureau of Land Management, is an input-output model. Because IMPLAN sectoring is linked to Bureau of Economic Analysis (BEA) Benchmark input-output data, IMPLAN's sectors are modified when BEA Benchmark data are modified. Earlier versions of IMPLAN used 528 industry sectors which were

reduced to 509 sectors with the release of 1997 BEA Benchmark data, and the current IMPLAN version utilizes 440 industrial sectors after the release of 2002 BEA Benchmark data.

This study used 2009 IMPLAN data to construct models for each of the 13 southern states. The models consisted of 440 sectors and forest-related sectors were aggregated into four primary forest-based industry sectors: forestry, paper and allied products, wood furniture, and lumber and wood products. IMPLAN models were constructed for each forest-based industry and state, and the results were compared to Tilley and Munn (2007a, 2007b), which used 509 industrial sectors. The bridge table provided by MIG (www.implan.com) which documents how sectors in the old 509 sector model correspond to the 440 sectors in the new model was used to ensure that equivalent sectors were aggregated into four major forest-based sectors. The aggregated sectors are listed in Table 1.

Results from this study were compared to 2001 study results by Tilley and Munn (2007a and 2007b). To make the results comparable, the same data sources were used wherever possible. Forest-based employment and earnings were obtained from IMPLAN data; value of shipments and manufacturing value-added were obtained from 2009 Annual Survey of Manufacturers report (American Fact Finder); and Gross State Products values were obtained from the U.S. Department of Commerce Bureau of Economic Analysis. 2009 forest-based earnings were compared to 2001 earnings estimated by Tilley and Munn (2007a) and employment was compared to Tilley and Munn (2007b) using IMPLAN data. Manufacturing value of shipments and value-added were compared to Tilley and Munn (2007b). For manufacturing value of shipments and

value-added, Tilley and Munn (2007b) used the North American Industrial Classification System (NAICS) codes 321 (wood product manufacturing) and 322 (paper manufacturing), this study also used aggregated NAICS code 321 and 322 as a aggregated forest-based industry sector.

3.4 Results

3.4.1 Economic contributions of forest-based industry in 2009 dollars

Forest-based employment and earnings accounted for 0.84% and 0.98% of the South's totals in these categories (Table 3 and 5). Among the four primary forest-based industry sectors, employment was greatest in the wood furniture sector, accounting for 34.47% of the forest-based industry employment, whereas the paper and allied products sector generated the most earnings,45.93% of the industry total for the region. Forest-based value of shipments and manufacturing value-added represented 11.60% and 12.99% of the South's totals for these categories (Table 8 and 9). The paper manufacturing sector (NAICS 322) had the largest percentage of value of shipments and manufacturing value-added of the South's forest-based industry, 70.94% and 75.31% respectively.

At the state level, North Carolina generated the largest share of the South's forest-based industry employment (14.63%) and Texas generated the largest share of South's forest-based earnings (13.12%). Although Texas had the largest share (24.29%) of total industry employment in the South, it had only 13.03% of the South's forest-based employment. In contrast, North Carolina accounted for only 9.06% of total industry employment in the South but had the largest share (14.63%) of forest-based employment. Although, Mississippi had the smallest employment and earnings share, 2.60% and

2.17% respectively, of the South's total employment, and earnings, had the largest share of forest-based employment and earnings, 2.46% and 2.93% respectively, relative to the state's employment (Table 3 and 5). Georgia contributed the largest percentage of forest-based value of shipments (13.68%) and manufacturing value-added (13.79%) to the South's forest-based industry.

Sector wide, for lumber and wood products and paper and allied products sectors, Georgia generated the highest percentage of employment (11.66% and 13% respectively) and earnings (11% and 13.23% respectively). While for the wood furniture sector, North Carolina generated the highest percentage of employment (21.49%) and earnings (21.31%).

For paper manufacturing (NAICS 322), Georgia contributed largest value of shipments (14.70%) and manufacturing value-added (15.25%) while for wood products manufacturing (NAICS 321), North Carolina accounted largest percentage of value of shipments (14.04%) and second largest percentage of manufacturing value-added (14.22%), after Texas (15.40%). Arkansas had the smallest share (3.04% and 2.92%) of the South's total value of shipments and manufacturing value-added, but had the largest forest-based value of shipments (26.46%) and manufacturing value-added (32.14%) as a percentage of the state's value of shipments and manufacturing value-added. Although Texas accounted the largest percentage (29.72% and 26.57%) of total value of shipments and manufacturing value-added, it also had the smallest percentage of total forest-based value of shipments (4.03%) and manufacturing value-added (4.92%) (Table 9).

Forest-based manufacturing value-added as a percentage of the South's Gross State Product (GSP) was 1.96%. As a percentage of state's GSP, Arkansas had the largest share (6.25%) while Texas had the smallest (0.75%) share (Table9).

3.4.2 Comparison of 2009 results with 2001 results in nominal and real dollar

3.4.2.1 Forest-based employment

Forest based employment for the South decreased from 718,176 in 2001 to 478,641 in 2009, a 33.35% decrease. Over the same period, total regional employment increased 5.25% (Tables 2 and 3). Forest-based employment represented 1.32% of total regional employment in 2001 (Table 2) but decreased to 0.84% in 2009 (Table 3). Regional forest-based employment varied considerably within the sectors. Except for the forestry sector, employment in all other forest sectors decreased from 2001 to 2009. Employment in the forestry sector increased from 6,034 to 8,192. Among the other three forest-based sectors, paper and allied products sector was least affected (-26.01%), while lumber and wood products, and wood furniture sector employment decreased by 37.28% and 36.67%, respectively.

Among states, forest-based employment varied substantially. North Carolina had the greatest percentage decrease (-43.34%) whereas South Carolina was least affected (-20.54%). Between 2001 and 2009, there was no greater shift in employment as a percentage of a state's total employment. The ranks among states as a percentage of total forest-based employment to total state changed somewhat with Florida remaining last and Mississippi ranking first in generating forest-based employment as a percentage of total state employment between 2001 and 2009. For all sectors (except forestry) and all states, employment decreased from 2001 to 2009 except for the wood furniture sector of

Louisiana (increased by 3.32%). For lumber and wood products sector, Kentucky lost maximum percentage of jobs (-49.78%) and North Carolina lost maximum number of jobs which was above 12,000. For wood furniture sector from 2001 to 2009, North Carolina lost the maximum jobs (-50.75%) where as Louisiana generated more jobs (increase of 3.32%). For paper and allied products sector, Mississippi lost the highest percentage of jobs (-45.23%) and Georgia lost maximum number of jobs (8,954) where as Oklahoma lost the fewest jobs overall (-8.99%) from 2001 to 2009.

3.4.2.2 Forest-based earnings

Regional total industry earnings increased by 7.98% while forest-based earnings decreased by 18.44% in real terms from 2001 to 2009 (Tables 4 and 6). Forest-based earnings in the South decreased by 1.33 billion in nominal dollars (Table 4 and 5) but in real dollars it decreased by 5.41 billion. Forest-based earnings in real terms, as a percentage of earnings for the South, decreased from 1.41% to 1.07%. The decline in South's forest based earning ranged from 17.02% to 21.87% across sectors, paper and allied products being the least affected sector.

Among states, in real terms, Arkansas had the largest decline in forest-based earnings (-42.27%) whereas South Carolina had the smallest decline (-3.02%). Forest-based earnings as a percentage of state's total industry earnings decreased for all states in real terms except for Louisiana, whose earnings increased from 1.41% in 2001 to 1.44% in 2009.

In lumber and wood products sector, Kentucky had the greatest decline in earnings (-32.14%) whereas Louisiana had the smallest decline (-3.65%). Earnings for the wood furniture sector for all states, with the exception of Kentucky, Louisiana and

Texas, decreased with North Carolina having the highest decline (-38.80%) and Georgia having the lowest decline (-5.36%). Earnings for the paper and allied products sector increased in Oklahoma (19.22%) and South Carolina (1.23%) and decreased in all other states with Arkansas (-59.15%) showing the greatest decline in earnings.

3.4.2.3 Forest-based value of shipments

Forest-based industry's value of shipments in nominal dollars increased from $98.02 billion (Table 7) to $188.01 billion (Table 8) from 2001 to 2009, but in real terms it increased to $156.05 billion (Table 10). In 2001 dollars, value of shipments increased by 59.02%.

Within the region, each state's forest based value of shipments increased in real terms. Oklahoma had the highest increase in value of shipments by 110.28% whereas Mississippi had the lowest increase of 25.31%.

3.4.2.4 Forest-based manufacturing value-added

Forest-based industry's value-added in nominal dollars increased from $42.20 billion to $85.52 billion from 2001 to 2009 (Table 7 and 9) but in real terms it increased to $70.99 billion. In nominal terms, as a percentage of total manufacturing value-added, regional forest-based value-added increased from 7.29% to 12.99% from 2001 to 2009, but in real terms it increased to 13.98%.Within the region, in 2001 dollars, each state's forest-based value-added increased.

Forest-based industry manufacturing value-added as a percentage of the South's GDP increased from 1.41% to 1.96% in nominal terms and in real terms to 2.11% from

2001 to 2009 (Table 7 and 10). At the state level, forest-based value-added, as a percentage of GSP, increased for all southern states except Virginia.

3.5 Discussion and conclusions

Two dramatic changes were evident between 2001 and 2009: an abrupt decline in forest-based employment and earnings, and a sharp increase in forest-based value of shipments and manufacturing value-added after accounting for inflation. These results suggest that the industry has become more capital intensive and has reduced profits margins in order to maintain its production during the recession.

The recent recession and the drastic decline in housing starts clearly impacted the forest-based industry. Although total state employment and earnings for the southern region increased, forest-based employment and earnings decreased substantially. This decrease is consistent with a longer term trend, for example, employment decreased from 770,000 direct jobs in 1997 (Abt et al. 2002) to 718,000 in 2001 (Tilley and Munn 2007b) and then to 573,000 in 2004 (Brandeis et al. 2012), however, it was much greater in the recent downturn (Hodges et al. 2007). This suggests that the recent recession and associated sharp decline in housing and other constructional activities had a disproportionately large negative impact on forest-based industries. Thus, recovery of housing and other constructional activities is critical to reviving the southern forest economy.

Among states, North Carolina was most affected by this downturn however; it is still the major contributor to South's wood furniture sector and also to the South's total forest-based economy. Mississippi had the smallest economy in the region; however, the percentages of forest-based employment and earnings relative to total state employment

and earnings were greatest in the region. Alternatively, Texas, the state with the largest economy, had the lowest percentage of forest-based economy relative to the state's economy. This suggests that forest based industries are comparatively more important to states with small economies.

Among forest-based industry sectors, the paper and allied products sector made the largest contribution to the regional economy. However, all forest-based industry's sectors economic contribution declined during 2001 to 2009. As softwood lumber is a major raw material in construction and housing, the lumber and solid wood products sector was more highly impacted than the paper and allied products sector. In addition, the wood furniture sector includes wood windows and doors, and cabinet subsectors, which are closely associated with housing and so were strongly impacted by the economic downturn. To deal with the effects of economic downturn, the forest-based industry shrank jobs and earnings during 2001 to 2009. Nevertheless, forest-based average annual earnings for the South in 2001 ($39,000) (Tilley and Munn 2007a) increased by $17,000 ($56,000) in 2009 in nominal dollars and $8,000 in real dollars. In 2009, average forest-based earnings were $8,000 greater than that of the South average earnings. In addition, most southern states had larger proportion of the forest-based employment and earnings relative to the South's forest based industry than state's total industry employment and earnings relative to the South's total industry. This suggests that forest-based industry had larger impact than non-forestry related industry to the South economy.

Thus, the forest-based industry is an important component of the South's economy although it contracted in past years. With the recovery of housing markets and

regional economy in years to come, the forest-based industry can play a more significant economic role. This study updates economic information about the forest-based industry which is important in policy formation to strengthen these sectors.

Table 3.1 IMPLAN sectors included in the aggregated forest products sector.

Aggregated forest products sectors	IMPLAN sectors (NAICS code*) contained in the aggregated sector
Lumber and wood products	Logging (1133); sawmills and wood preservation (3211); veneer and plywood manufacturing (321211, 321212); engineered wood members and truss manufacturing (321213, 321214); reconstituted wood products manufacturing (321219); wood container and pallet manufacturing (32192); prefabricated wood building manufacturing (321992); all other miscellaneous wood product manufacturing (321999)
Paper and allied products	Pulp mills (32211); paper mills (32212); paperboard mills (32213); paperboard container manufacturing (32221); coated and laminated paper, packaging paper manufacturing (322222, 322221); all other paper bag and coated and treated paper manufacturing (322223, 322226, 322224, 322225); stationary product manufacturing (32223); sanitary paper product manufacturing (322291); all other converted paper product manufacturing (322299)
Wood furniture	Wood windows and door and millwork manufacturing (32191), wood kitchen cabinet and counter top manufacturing (33711); upholstered household furniture manufacturing (337121); non-upholstered wood household furniture manufacturing (337122); institutional furniture manufacturing (337127); wood TV , radio and sewing machine housing (337129); wood office furniture manufacturing (337211); custom architectural woodwork and millwork (337212, 337214); showcase, partitions, shelving and lockers (337215)

*Numbers in the parenthesis are North American Industrial Classification System (NAICS) codes.

Table 3.2 2001 South's forest-based employment by state and region for each forest-based sector (Tilley and Munn 2007b).

State	Total State	Forestry	Lumber and wood products	Wood furniture	Paper and allied products	Total forest based	Total forest-based as % of total state
Alabama	2,421,223	338	25,467	14,530	16,356	56,691	2.34
Arkansas	1,517,570	546	20,362	9,926	13,479	44,313	2.92
Florida	9,172,732	838	17,077	19,008	11,614	48,537	0.53
Georgia	4,964,658	1,018	26,761	16,144	27,910	71,833	1.45
Kentucky	2,327,652	57	16,047	8,415	10,616	35,135	1.51
Louisiana	2,502,534	548	13,544	1,732	10,542	26,366	1.05
Mississippi	1,481,891	459	21,748	27,121	7,762	57,090	3.85
North Carolina	4,924,710	517	29,921	71,997	21,148	123,583	2.51
Oklahoma	2,064,469	113	4,265	3,753	2,930	11,061	0.54
South Carolina	2,280,026	381	13,121	6,129	14,736	34,367	1.51
Tennessee	3,472,042	209	17,172	23,762	20,573	61,716	1.78
Texas	12,638,113	835	28,435	32,058	26,004	87,332	0.69
Virginia	4,523,325	175	20,696	25,914	13,367	60,152	1.33
South	54,290,945	6,034	254,616	260,489	197,037	718,176	1.32

Table 3.3 2009 South's forest-based employment by state and region for each forest-based sector.

State	Total State	Forestry	Lumber and wood products	Wood furniture	Paper and allied products	Total forest based	Total forest-based as % of total state
Alabama	2,483,858	366	15,347	11,183	12,447	39,342	1.58
Arkansas	1,536,622	581	12,912	6,673	10,352	30,518	1.99
Florida	9,725,755	2,227	10,778	11,787	9,282	34,074	0.35
Georgia	5,238,732	1,184	18,614	12,159	18,956	50,913	0.97
Kentucky	2,320,324	92	8,059	7,808	9,146	25,104	1.08
Louisiana	2,492,614	461	9,930	1,790	7,059	19,239	0.77
Mississippi	1,484,021	385	13,850	18,060	4,252	36,546	2.46
North Carolina	5,178,695	799	17,349	35,458	16,417	70,024	1.35
Oklahoma	2,117,525	361	2,449	2,054	2,667	7,531	0.36
South Carolina	2,421,264	351	10,429	3,806	12,724	27,310	1.13
Tennessee	3,525,365	339	9,589	13,250	15,743	38,921	1.10
Texas	13,880,603	960	17,758	26,031	17,635	62,384	0.45
Virginia	4,738,106	86	12,627	14,914	9,109	36,735	0.78
South	57,143,482	8,192	159,689	164,972	145,788	478,641	0.84

Table 3.4 2001 South's forest-based total earnings by state and region for each forest-based sector (Tilley and Munn 2007a).

State	Total State Earnings ($MM)	Lumber and wood products ($MM)	Wood furniture ($MM)	Paper and allied products ($MM)	Total forest-based ($MM)	Total forest-based as % of total state ($MM)
Alabama	78,499.50	854.90	417.50	1,116.20	2,388.60	3.04
Arkansas	43,792.90	611.40	275.30	1,522.70	2,409.40	5.50
Florida	315,613.90	548.50	556.50	634.50	1,739.50	0.55
Georgia	194,681.80	933.30	478.10	1,624.60	3,036.00	1.56
Kentucky	74,231.60	407.00	265.30	526.70	1,199.00	1.62
Louisiana	80,588.30	473.60	37.30	629.00	1,139.90	1.41
Mississippi	42,089.90	684.70	796.00	453.60	1,934.30	4.60
North Carolina	170,379.60	944.20	2,034.70	1,066.40	4,045.30	2.37
Oklahoma	63,086.80	134.40	96.50	136.10	367.00	0.58
South Carolina	73,015.30	462.10	174.80	879.10	1,516.00	2.08
Tennessee	117,512.40	497.20	690.30	1,146.40	2,333.90	1.99
Texas	504,759.20	955.50	949.60	1,327.90	3,233.00	0.64
Virginia	183,930.60	646.00	731.50	753.20	2,130.70	1.16
South	1,942,181.80	8,152.80	7,503.40	11,816.40	27,472.60	1.41

Table 3.5 2009 South's forest-based total earnings by state and region for each forest-based sector.

State	Total State earnings ($MM)	Forestry ($MM)	Lumber and wood products ($MM)	Wood furniture ($MM)	Paper and allied products ($MM)	Total forest-based ($MM)	Total forest-based as % of total state
Alabama	108,135.93	22.42	715.66	454.83	1,254.70	2,447.62	2.26
Arkansas	63,562.63	33.11	543.98	283.82	761.09	1,621.99	2.55
Florida	437,720.23	56.91	419.73	512.55	768.18	1,757.37	0.40
Georgia	253,277.38	86.05	844.43	523.67	1,613.98	3,068.12	1.21
Kentucky	99,822.87	3.53	304.64	310.71	638.40	1,257.28	1.26
Louisiana	115,645.61	34.46	513.20	67.53	667.58	1,282.77	1.11
Mississippi	58,619.56	33.64	617.30	704.99	360.52	1,716.45	2.93
North Carolina	236,488.24	26.16	746.09	1,458.28	1,220.77	3,451.30	1.46
Oklahoma	92,442.27	12.15	115.20	80.28	202.34	409.97	0.44
South Carolina	100,262.04	15.25	491.64	150.87	1,091.60	1,749.36	1.74
Tennessee	158,481.79	21.26	411.33	521.27	1,382.94	2,336.80	1.47
Texas	713,492.55	70.73	816.96	1,122.90	1,473.58	3,484.17	0.49
Virginia	267,684.40	4.08	555.12	652.89	762.46	1,974.55	0.74
South	2,705,635.50	419.74	7,095.27	6,844.60	12,198.14	26,557.75	0.98

Table 3.6 2009 South's forest-based total earnings by state and region for each forest-based sector expressed in 2001 dollars.

State	Total State earnings ($MM)	Forestry ($MM)	Lumber and wood products ($MM)	wood furniture ($MM)	Paper and allied products ($MM)	Total forest-based ($MM)	Total forest-based as % of total state
Alabama	88,378.40	18.66	644.88	392.95	991.40	2,047.88	2.32
Arkansas	48,157.66	27.56	498.24	243.24	621.97	1,391.00	2.89
Florida	353,081.06	47.37	375.42	442.45	625.34	1,490.58	0.42
Georgia	204,533.88	71.61	761.90	452.46	1,294.91	2,580.88	1.26
Kentucky	79,048.40	2.94	276.20	271.79	521.16	1,072.08	1.36
Louisiana	74,333.22	28.68	456.32	58.67	529.81	1,073.48	1.44
Mississippi	43,686.98	28.00	552.75	598.50	289.30	1,468.54	3.36
North Carolina	192,779.33	21.77	667.13	1,245.16	971.09	2,905.14	1.51
Oklahoma	65,058.04	10.11	105.22	69.52	162.26	347.11	0.53
South Carolina	79,704.21	12.69	436.38	131.25	889.93	1,470.24	1.84
Tennessee	126,427.35	17.69	367.16	448.52	1,109.05	1,942.42	1.54
Texas	527,005.62	58.86	726.04	962.82	1,193.84	2,941.57	0.56
Virginia	215,007.54	3.40	500.71	565.08	604.50	1,673.69	0.78
South	2,097,201.70	349.32	6,369.62	5,881.69	9,805.58	22,406.21	1.07

Table 3.7 2001 South's forest-based industries (FBI) manufacturing sector value of shipments, value-added, and gross state product (GSP) (Tilley and Munn 2007b).

State	Value of shipments ($MM)			Manufacturing value-added($MM)			GSP ($MM)	Value-added as % of GSP
	Total industry	FBI	%	All	FBI	%		
Alabama	67,172.00	9,799.00	14.59	27,844.00	4,153.00	14.92	120,291.00	3.45
Arkansas	46,530.00	6,897.00	14.82	19,868.00	2,601.00	13.09	69,063.00	3.77
Florida	75,541.00	6,005.00	7.95	39,974.00	2,620.00	6.55	493,218.00	0.53
Georgia	127,624.00	14,256.00	11.17	57,578.00	6,430.00	11.17	296,786.00	2.17
Kentucky	84,180.00	5,441.00	6.46	31,722.00	2,365.00	7.46	117,151.00	2.02
Louisiana	85,488.00	6,138.00	7.18	22,545.00	2,532.00	11.23	132,899.00	1.91
Mississippi	38,560.00	5,153.00	13.36	15,573.00	2,007.00	12.89	66,233.00	3.03
North Carolina	167,124.00	10,374.00	6.21	91,184.00	4,205.00	4.61	284,769.00	1.48
Oklahoma	40,063.00	1,948.00	4.86	18,059.00	1,012.00	5.60	92,406.00	1.10
South Carolina	78,738.00	6,875.00	8.73	35,017.00	3,364.00	9.61	117,757.00	2.86
Tennessee	104,109.00	6,809.00	6.54	46,349.00	2,953.00	6.37	180,792.00	1.63
Texas	321,361.00	10,346.00	3.22	120,086.00	4,480.00	3.73	744,842.00	0.60
Virginia	92,874.00	7,982.00	8.59	53,043.00	3,471.00	6.54	275,725.00	1.26
South	1,329,364.00	98,022.00	7.37	578,842.00	42,195.00	7.29	2,991,932.00	1.41

Table 3.8 2009 South's forest-based industries (FBI) manufacturing sector value of shipments.

State	Total industry	Value of shipments ($MM) Forest-based industries			%
		NAICS 321	NAICS 322	Total	
Alabama	90,530.75	4,838.56	15,436.53	20,275.09	22.40
Arkansas	49,324.25	3,771.73	9,281.36	13,053.09	26.46
Florida	85,562.03	3,388.26	7,437.90	10,826.16	12.65
Georgia	120,613.63	6,115.38	19,600.89	25,716.27	21.32
Kentucky	89,582.15	2,842.78	9,591.57	12,434.35	13.88
Louisiana	157,399.67	2,697.51	9,392.22	12,089.74	7.68
Mississippi	52,483.03	3,493.81	4,072.94	7,566.75	14.42
North Carolina	165,970.50	7,669.32	12,086.31	19,755.63	11.90
Oklahoma	56,446.85	397.61	4,550.98	4,948.59	8.77
South Carolina	73,524.74	3,453.76	13,732.04	17,185.80	23.37
Tennessee	112,860.82	3,017.58	9,393.26	12,410.84	11.00
Texas	481,827.37	7,545.64	11,867.95	19,413.59	4.03
Virginia	85,107.32	5,412.07	6,918.36	12,330.43	14.49
South	1,621,233.11	54,644.00	133,362.33	188,006.33	11.60

Table 3.9 2009 South's forest-based industries (FBI) manufacturing sector value-added.

State	Manufacturing value-added ($MM)					GSP ($MM)	Value-added as % of GSP
	Total industry	Forest-based industries					
		NAICS 321	NAICS 322	Total	%		
Alabama	36,183.60	1,933.01	7,977.28	9,910.29	27.39	166,819.00	5.94
Arkansas	19,208.49	1,423.32	4,749.82	6,173.14	32.14	98,795.00	6.25
Florida	43,792.83	1,535.06	3,380.43	4,915.49	11.22	732,782.00	0.67
Georgia	53,437.04	1,974.59	9,821.42	11,796.00	22.07	394,117.00	2.99
Kentucky	31,994.28	1,210.24	4,620.06	5,830.30	18.22	155,789.00	3.74
Louisiana	41,819.95	973.88	4,681.08	5,654.95	13.52	205,117.00	2.76
Mississippi	21,222.95	1,156.76	1,908.35	3,065.10	14.44	94,406.00	3.25
North Carolina	84,450.99	3,002.31	4,832.95	7,835.25	9.28	407,032.00	1.92
Oklahoma	22,886.38	173.04	2,690.00	2,863.04	12.51	142,388.00	2.01
South Carolina	31,477.41	1,215.67	7,007.41	8,223.08	26.12	158,786.00	5.18
Tennessee	48,282.48	1,339.26	4,501.50	5,840.76	12.10	243,849.00	2.40
Texas	174,880.70	3,252.44	5,353.36	8,605.80	4.92	1,146,647.00	0.75
Virginia	48,657.74	1,924.96	2,881.82	4,806.79	9.88	409,732.00	1.17
South	658,294.82	21,114.53	64,405.47	85,520.00	12.99	4,356,259.00	1.96

Table 3.10 2009 South's forest-based industries (FBI) manufacturing sector value of shipments, value-added, and gross state product expressed (GSP) in 2001 dollars.

State	Value of shipments ($MM)			Manufacturing value-added ($MM)			GSP ($MM)	Value-added as % of GSP
	All	FBI	%	All	FBI	%		
Alabama	73,989.86	16,559.27	22.38	29,572.49	8,094.03	27.37	136,339.47	5.94
Arkansas	37,370.07	11,063.87	29.61	14,553.14	5,232.39	35.95	74,851.15	6.99
Florida	69,017.44	9,054.09	13.12	35,324.89	4,110.90	11.64	591,088.62	0.70
Georgia	97,401.41	21,254.57	21.82	43,153.03	9,749.43	22.59	318,268.77	3.06
Kentucky	70,938.91	10,496.98	14.80	25,335.84	4,921.89	19.43	123,367.24	3.99
Louisiana	101,171.38	9,942.97	9.83	26,880.50	4,650.81	17.30	131,842.52	3.53
Mississippi	39,113.65	6,457.00	16.51	15,816.67	2,615.57	16.54	70,357.28	3.72
North Carolina	135,295.03	16,294.75	12.04	68,842.35	6,462.64	9.39	331,802.36	1.95
Oklahoma	39,725.56	4,096.22	10.31	16,106.73	2,369.90	14.71	100,208.32	2.36
South Carolina	58,449.16	14,296.26	24.46	25,023.25	6,840.49	27.34	126,228.36	5.42
Tennessee	90,033.65	10,146.18	11.27	38,516.89	4,774.98	12.40	194,528.24	2.45
Texas	355,891.22	16,160.63	4.54	129,171.79	7,163.80	5.55	846,945.64	0.85
Virginia	68,359.29	10,267.90	15.02	39,082.52	4,002.75	10.24	329,101.99	1.22
South	1,250,772.71	156,052.55	12.48	507,870.95	70,984.92	13.98	3,360,830.63	2.11

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CHAPTER IV

EVALUATING CHANGES IN TAX CONTRIBUTIONS OF THE FOREST PRODUCTS INDUSTRY IN THE U.S. SOUTH

4.1 Abstract

The forest products industry is major contributor to the South's economy. With the global recession of 2009 and associated downturn of U.S. housing and other construction activities, the forest products industry's economic activities have been severely affected. Impact Analysis for Planning (IMPLAN) model was used to assess the tax impacts of this event for the forest products industry for thirteen southern states using 2009 data. The paper and allied products sector accounted for the greatest percentage of taxes paid by the forest products industry. Between 2001 and 2009, taxes generated by economic activities related to the forest products industry decreased by 10.9%. This decline was greatest for North Carolina which had a 25.4% decrease in tax impacts. Among the forest products industry sectors, only paper and allied products industry tax impacts increased from 2001 to 2009.

4.2 Introduction

Forest resources, covering 214 million acres in the South (Alvarez 2007), are a major source of government revenue. In 2001, the South's forest products industry generated $115.30 billion of total industry output (Tilley and Munn 2007) and

contributed $21.32 billion in taxes (Tilley 2006). Taxes resulting from forest products industry activity were highly affected by the decline in U.S. housing starts and recent economic recession.

The decline in housing starts and loss of demand for southern pine lumber resulted in a decrease in the forest products industry's overall production (Woodall et al. 2011). There were 1,022 mill closures from 1999 to 2009 (Brandeis et al. 2012) and the associated loss of thousands of jobs adversely affected the forest products industry's production and tax contributions in the South. Thus, this study estimates how the tax contributions generated by the forest products industry and the economic activity it generates were impacted by events associated with the global recession of 2009 and decline in U.S. housing and other construction activities.

Input-output analysis, developed by Wassily Leontief (Leontief 1986), is one of the best tools to show the linkage between various industrial sectors and to estimate direct, indirect, and induced effects. Direct effects are the initial effects of the industry on the economy whereas indirect effects result from inter-industry spending within the economy. Thus, a financial shock in one sector affects all related sectors within the regional economy (Cline and Seidl 2010). Induced effects refer to household spending resulting from direct and indirect wages and salaries. With the advent of Impact Analysis for Planning (IMPLAN), an input-output modeling system, it has been much easier to model the economic impact of industrial sectors and observe changes in these sectors over time.

Understanding how the forest products industries' tax impacts change over time, across states, and across the three primary sectors of the forest products industry can

prove useful to policy makers at both the federal and state/local level. The tax system may protect and promote local industries by imposing higher taxes on foreign goods. Thus, taxes help in local economic development and develop economic security in the country. Also, investments made at the state/local level that are supportive to the forest products industry can be justified by examining the tax impacts. As the size and forest products industry and its subsectors change over time the tax impacts of each will also change. Understanding these resulting changes in tax impacts over time can provide guidance to policy makers. Thus, a tax impact analysis of the forest products industry will provide insight into key factors useful for policy makers addressing critical economic issues and working to strengthen the economic health of these sectors.

This study updates and compares Tilley (2006), which utilized 2001 IMPLAN data, and determines the tax impact using 2009 IMPLAN data for three primary forest products industry sectors. Results from this study will provide a detailed picture of how recent economic changes have impacted tax contributions of the South's forest products industry. Consequences of the housing collapse and recent recession on tax contributions of the forest products industry are calculated for federal government non-defense taxes and state/local government non-education taxes, which are further categorized into corporate profit taxes, indirect business taxes (IBTs), personal taxes, and social insurance taxes.

Corporate profit tax is the levy placed on profit earned by a business firm whereas IBTs are the taxes indirectly paid by households, and employers act as the collecting agency. Thus, taxes are indirectly paid by household sectors and business sectors pay these taxes to government sector. IBTs are collected in the form of sales taxes, property

taxes, motor vehicle license taxes, severance taxes, other taxes (consisting of business licenses and documentary and stamp taxes), non-tax revenues (royalties, special assessment, fines, settlements, and donations), excise taxes, and custom duties. Personal taxes and social insurance taxes are levied on individual wages and salaries after adjustment for allowable deductions. Personal taxes are collected in the form of income taxes, non-tax revenues (fines and donations), motor vehicle fee payments, property taxes, and other taxes (hunting, fishing, and other personal licenses). Social insurance taxes are collected from employee contributions (retirement plans, temporary disability insurance, social security, survivors insurance, veterans life insurance, supplement medical insurance, and unemployment insurance), employer contributions (workers' compensation and temporary disability insurance), and from self-employed individuals.

4.3 Methodology

Input-output models were used to estimate tax impacts of the forest products industry for 13 southern states: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia. Input-output modeling tracks the flow of money from producers to various intermediate sectors and finally to final consumers and measures impacts throughout the economy.

IMPLAN, an input-output model, was used to assess the economic impacts of the forest products industry. IMPLAN was originally developed by the USDA in cooperation with the Federal Emergency Management Agency and USDI Bureau of Land Management; and is currently managed by Minnesota IMPLAN Group (MIG). The current IMPLAN model consists of 440 industrial sectors and MIG provides yearly

IMPLAN data. This study used 2009 IMPLAN data to analyze tax impacts[1] of the forest products industry. For reporting purposes, the forest products industry sectors were aggregated into three broad sectors: lumber and wood products, wood furniture, and paper and allied products. Tax impacts of these sectors were estimated using IMPLAN Version 3.0 software. The sources of tax impacts derived from the IMPLAN database are from National Income and Product Accounts (NIPA) table, Consumer Expenditure Survey (CSE), Annual Survey of State and Local Finances (SLGF), and Regional Economic Accounts (REA) (Olson 1999).

IMPLAN models were constructed for 13 southern states and impact analyses were conducted for each forest products industry sector. Tax impacts of the forest products industry in 2009 dollars were compared to 2001 tax impacts (Tilley 2006) in nominal dollars, which in the 2001 IMPLAN model, consisted of 509 industrial sectors. The bridge table between 509 and 440 sectors provided by MIG was used to relate new sectors to the old. IMPLAN estimates not only the direct impacts of the forest products industry but also the indirect and induced impacts. In this study, the reported tax contributions are the total impacts of the industry, i.e. the sum of direct, indirect and induced tax impacts.

[1] Federal government defense and state/local government education were not selected in multiplier specification while building the model. As only the default institutions were selected, this study reports only federal government non-defense taxes and state/local non-education taxes.

4.4 Results

4.4.1 2009 tax impacts of the forest products industry

At the regional level, the forest products industry in the South generated $19.7 billion in taxes (Table 1). Of this total, the paper and allied products sector generated $11.1 billion (56%). The lumber and wood products sector generated $4.33 billion (22%) and wood furniture sector generated $4.28 billion (22%).

At the state level, the forest products industry in Texas generated the most tax contributions ($2.7 billion). North Carolina and Georgia also generated over $2 billion in tax contributions. Only four states in the region generated less than $1billion: Kentucky, Louisiana, Mississippi, and Oklahoma

The paper and allied products sector generated more taxes than either the lumber and wood products sector or the wood furniture sector in all states in the region except Mississippi. In Texas, North Carolina, Alabama, and Georgia, the paper and allied products sector alone produced over $1billion in combined tax contributions.

The tax contributions of the lumber and wood products sector were substantially smaller than the paper and allied products sector, with only two states, Georgia ($534 million) and Texas ($573 million) generating more than $500 million in combined taxes. At the other extreme, only Oklahoma and Kentucky generated less than $200 million.

The tax contributions of the wood furniture sector ranged from $868 million (North Carolina) to $38 million (Louisiana). In addition to North Carolina, only Texas ($809 million) generated tax contributions exceeding $800 million. Virginia was a distant third at $381 million.

4.4.2 Federal versus State and Local Taxes

Federal government non-defense contributions generated by the forest products industry in the South totaled $11.7 billion and represented 59% of taxes generated by the industry. State and local non-educational taxes accounted for the remaining $8.0 billion (41%). This ratio varied among sectors of the forest products industry. For the wood furniture industry, federal taxes represented 64% of the total, in lumber and wood products, 60%, and paper and allied products, 57%. The percentage also varied from state to state, ranging from 66% in Virginia to 42% in Arkansas. The range is even greater across states and sectors, ranging from 70% for the wood furniture sector in Virginia to 41% for the paper and allied products sector in Arkansas.

4.4.3 Federal non-defense taxes

Of the federal taxes captured in this analysis, social insurance taxes accounted for $6.45 billion, 55% of the total $11.7 billion generated by the forest products industry in the South (Table2.). Personal taxes totaled $2.8 billion (24%), corporate profit taxes accounted for $1.3 billion (11%), and indirect business taxes accounted for the remaining $1.1 billion (9%). These percentages varied only slightly among sectors. For the paper and allied products sector, social insurance taxes accounted for 54%, personal taxes 23%, corporate profits taxes 13% and indirect business taxes 11%. For the remaining two sectors, the percentages were: social insurance taxes 57%, personal taxes 25%, corporate profits taxes 10%, and indirect business taxes 8%. The variation was greater among states. In Arkansas, social insurance taxes accounted for 68% of federal taxes. Personal taxes accounted for 16%, indirect business taxes 3% and corporate profit taxes 13%. At the other extreme, social insurance taxes accounted for only 46% of the total in Texas,

with personal taxes accounting for 32% and corporate profit taxes and indirect business taxes accounting for 11% each. The range of variation across states and sectors, as would be expected, is greater than either among states or sectors with social insurance taxes ranging from a high of 71% for the wood furniture industry in Arkansas to 45% for the paper and allied products sector in Texas.

4.4.4 State and Local Non-education taxes

Of the state and local taxes captured by this analysis, indirect business taxes accounted for $5.9 billion (73%) of the $8.0 billion regional total (Table3.). Dividend taxes accounted for $857 million (11%), personal taxes - $802 million (10%), social insurance taxes - $250 million (3%) and corporate profit taxes - $221 million (3%). The paper and allied products sector accounted for $4.8 billion (60%), lumber and wood products - $1.7 billion (21%), and wood furniture - $1.5 billion (19%). There was very little variation among the three forest products sectors region-wide. For the paper and allied products sector, indirect business taxes accounted for 75% of the total. All the other categories of state and local taxes for all sectors were within one percent of the regional average. Variations across states were substantially greater. Three states, Arkansas, Texas and Virginia, did not levy corporate taxes. In Florida, indirect business taxes accounted for 87% of the state's $560 million collected; dividend taxes - 8%, personal taxes - 4%; social insurance taxes and corporate profit taxes - 1% or less. At the other extreme, in Arkansas indirect business taxes accounted for only 46% of the $789 million collected, personal taxes - 25%, social insurance taxes - 23%, and taxes on dividends - 7%. Across sectors and states, the variation was substantially greater. Indirect business taxes accounted for a low of 38% of the total collected for the wood

furniture sector in Arkansas compared to a high of 88% for the Texas paper and allied products sector and the Florida lumber and wood products sector.

4.4.5 Tax multipliers

State and local government, non-education tax SAM multipliers were larger than federal government non-defense tax SAM for all thirteen states and for the all forest products industry sectors. Florida had the highest combined tax SAM multipliers for lumber and wood products sector (4), wood furniture sector (3.56), and paper and allied products sector (3.72) among the thirteen states (Table 6). Mississippi, in contrast, had the lowest multipliers for the wood furniture sector (2.19) and the paper and allied products sector (2.29). For the lumber and wood products sector, the multipliers (2.52) were lowest in Kentucky.

Florida had the highest state and local government, non-education tax SAM multipliers for lumber and wood products sector (7.16) and wood furniture sector (9.73) whereas Texas had the highest multiplier for paper and allied products sector (4.96) (Table 4). Multipliers for the lumber and wood products sector and wood furniture sector were lowest in Arkansas (2.94 and 2.64, respectively). For the paper and allied products sector; Mississippi had the lowest multiplier (2.50).

Florida also had the highest federal government non-defense tax SAM multipliers for the wood furniture sector (2.70) and paper and allied products sector (3.22); whereas for the lumber and wood products sector, Tennessee had the highest multiplier (2.81) among the thirteen states (Table 5). Mississippi had the lowest multipliers for the wood furniture sector (1.77) and paper and allied products sector (2.12) and Kentucky had the lowest multiplier for lumber and wood product sector (2.13).

4.4.6 Changes since 2001

Between 2001 and 2009, the forest products industry's tax contributions for the southern region decreased by 7.6% in nominal dollars. There were, however, dramatic differences with regards to state and industry sectors.

Tax contributions generated by the forest products industry decreased for all but five states. Losses as a percentage of previous receipts ranged from -32.6% for North Carolina to -2.8% for Mississippi. Texas (2.9%), Alabama (5.2%) and Louisiana (7.8%) experienced modest gains while Arkansas (17.2%) and South Carolina (25.9%) experienced substantial gains. Tax contributions generated by the paper and allied products sector increased by 24.5% across the region. These gains, however, were offset by losses in the lumber and wood products sector (-31.0%) and the wood furniture sector (-30.2%). At the state level, changes in tax contributions by sector generally mirrored the changes for the region with gains in the pulp and paper industry offset by decreases for the wood furniture and lumber and wood products sectors. There were several notable exceptions. Tax contributions decreased from all sectors in Mississippi. Tax contributions generated by the wood furniture sector increased in Kentucky, Louisiana, and Texas. The tax contributions generated by the paper and allied products sector increased by more than 50% in Arkansas (52.2%), Oklahoma (61.5%), and South Carolina (54.0%).

Changes in tax contributions since 2001 were substantially different by category. The industry's federal government non-defense tax contributions decreased by 17.2% for the region and varied greatly across sectors. Federal tax contributions for the pulp and allied products sector increased by 6.6% but decreased 35.2% for the lumber and wood

products sector and 33.6% for the wood furniture sector. State/local government non-education tax contributions increased by 11.1% for the South but also differed substantially by sector. The paper and allied products sector generated an increase of 59.5% while those for wood furniture and lumber and wood products decreased by 23.2% and 23.5%, respectively.

At the state level, sector tax contributions by category roughly mirrored those for the region with the paper and allied sector showing increases for both federal and state and local tax contributions and the lumber and wood products sector and wood furniture sector showing losses for both categories. Exceptions included decreases in pulp and allied products federal tax contributions in Arkansas, Louisiana, Mississippi, and North Carolina; increases in wood furniture federal tax contributions in Louisiana and Texas; and increases in wood furniture local tax contributions in Alabama, Arkansas, Kentucky, Louisiana, and Texas.

4.5 Discussion and Conclusions

The major objectives of this study were to estimate the 2009 tax contributions of the forest products industry in the South and to identify changes since 2001. This study demonstrates how the fluctuations in economic activities lead to alterations in tax receipts. The forest products industry tax impacts (combined) during the study period declined for the South as a whole, depicting the negative impacts that the economic downturn had on tax receipts for the region. Federal government non-defense taxes decreased substantially however, state/local government non-education taxes increased. This implies that regional's federal government non-defense tax revenues were more sensitive to the economic downturn than were state/local government non-education

taxes. The composition of federal government non-defense taxes has changed markedly over the study period. In 2001, social insurance tax accounted for 45.2% and personal tax accounted for 36.6% to total federal government non-defense taxes (Tilley 2006). In 2009, these two taxes accounted for 55.3% and 24.0% respectively, reflecting region's trend toward social insurance taxation. Decline in federal government non-defense taxes was largely due to personal taxes being highly sensitive to prevailing economic conditions. However, indirect business taxes and social insurance taxes remain relatively flat during the period. The composition of state/local government non-education taxes continued to grow, except for personal taxes, during the period examined. About 35% decline in personal taxes was offset by combined (corporate profit tax, dividends, indirect business tax, and social insurance tax) taxes. These results indicate that when the recession began in 2001, personal taxes fell quickly causing overall tax revenues to decline.

The paper and allied products industry partially offset the decline in tax revenues from the lumber and wood products and wood furniture sectors. However, the combined negative tax impacts exceeded the increase from the paper and allied products sector resulting in a net decline in forest products industry tax impacts. Thus, the paper and allied products sector became the major contributor to the forest products industries' tax impact. North Carolina, which was a major contributor to the forest products industry taxes in 2001, was highly affected by recession driving it down to third largest contributor in 2009 among thirteen states. This was because of the wood furniture sector being highly sensitive to downturn.

The forest products industry is still a major tax contributor in the South; however industry-related taxes were negatively impacted by the global recession and decline in U.S. housing starts. Tax revenues are the result of the tax rate and tax base. The results of this study illustrate which sectors and tax types are most affected by economic cycles. This information can be used by policymakers to identify which sectors to favor if regulations or stimuli are being considered to improve or stabilize tax revenues. Likewise, this information helps policymakers at the state, local, or federal level know in advance the tax impacts from expected economic upturns or downturns so they can plan accordingly. As this study shows, the tax impacts vary considerably across sectors and across the different tax categories. Unfortunately, the various tax categories reported here are controlled by very different political entities and therefore optimizing total tax receipts is not a viable option. It is, however, possible to identify relevant parts and plan accordingly. At the very least, this information will help document the importance of the forest products industry to government budgets at all levels and hopefully garner support for the industry, its suppliers, employees and customers.

Table 4.1 Combined federal government non-defense taxes and state/local government non-education taxes generated by the forest products industry (FPI) in the U.S. South.

State	FPI	Total Federal Non-Defense Taxes ($MM)			% change since 2001	Total State/Local Non-Educational Taxes ($MM)			% change since 2001	Combined Total: Federal State/Local Taxes ($MM)		% change since 2001
		2001*	2009			2001*	2009			2001*	2009	
			Total Impact	% of total			Total Impact	% of total				
Alabama	Lumber & wood products	395.27	228.25	57.74	(42.25)	226.53	167.09	42.26	(26.24)	621.80	395.34	(36.42)
	Wood furniture	208.25	163.83	60.01	(21.33)	101.43	109.19	39.99	7.65	309.68	273.02	(11.84)
	Paper & allied products	565.21	621.67	51.55	9.99	284.65	584.29	48.45	105.27	849.86	1205.96	41.90
	Total	1168.72	1013.75	54.09	(13.26)	612.62	860.57	45.91	40.47	1781.34	1874.32	5.22
Arkansas	Lumber & wood products	277.11	164.48	43.23	(40.64)	165.76	216.04	56.77	30.33	442.86	380.52	(14.08)
	Wood furniture	135.08	91.30	45.43	(32.41)	67.12	109.69	54.57	63.42	202.20	200.99	(0.60)
	Paper & allied products	340.62	327.46	41.40	(3.86)	179.01	463.57	58.60	158.96	519.62	791.03	52.23
	Total	752.80	583.24	42.49	(22.52)	411.89	789.30	57.51	91.63	1164.69	1372.54	17.85
Florida	Lumber & wood products	333.40	213.15	64.53	(36.07)	159.59	117.15	35.47	(26.59)	492.98	330.30	(33.00)
	Wood furniture	356.76	250.44	66.21	(29.80)	152.82	127.80	33.79	(16.37)	509.58	378.24	(25.77)
	Paper & allied products	402.23	496.74	61.21	23.50	186.58	314.75	38.79	68.69	588.81	811.49	37.82
	Total	1092.38	960.32	63.18	(12.09)	498.99	559.71	36.82	12.17	1591.37	1520.03	(4.48)
Georgia	Lumber & wood products	488.84	336.30	62.94	(31.20)	281.84	198.04	37.06	(29.73)	770.68	534.34	(30.67)
	Wood furniture	285.97	231.04	65.01	(19.21)	150.57	124.34	34.99	(17.42)	436.54	355.38	(18.59)
	Paper & allied products	933.49	956.71	59.30	2.49	502.80	656.50	40.70	30.57	1436.29	1613.21	12.32
	Total	1708.31	1524.05	60.89	(10.79)	935.21	978.88	39.11	4.67	2643.51	2502.93	(5.32)
Kentucky	Lumber & wood products	194.94	98.37	54.24	(49.54)	119.43	82.99	45.76	(30.51)	314.37	181.36	(42.31)
	Wood furniture	118.79	102.38	55.92	(13.81)	61.58	80.71	44.08	31.07	180.38	183.09	1.50
	Paper & allied products	245.09	245.88	51.41	0.32	135.91	232.37	48.59	70.97	381.00	478.25	25.52
	Total	558.83	446.62	53.00	(20.08)	316.92	396.07	47.00	24.97	875.74	842.69	(3.77)
Louisiana	Lumber & wood products	193.09	158.93	58.27	(17.69)	118.16	113.83	41.73	(3.66)	311.25	272.76	(12.37)
	Wood furniture	18.87	23.03	61.20	22.05	10.64	14.60	38.80	37.22	29.50	37.63	27.56
	Paper & allied products	294.56	291.63	53.10	(0.99)	162.44	257.62	46.90	58.59	457.00	549.25	20.19
	Total	506.51	473.60	55.09	(6.50)	291.24	386.05	44.91	32.55	797.75	859.65	7.76
Mississippi	Lumber & wood products	289.17	185.56	57.61	(35.83)	177.30	136.56	42.39	(22.98)	466.47	322.12	(30.95)
	Wood furniture	347.98	209.18	61.82	(39.89)	175.79	129.21	38.18	(26.50)	523.76	338.39	(35.39)
	Paper & allied products	201.65	144.22	52.72	(28.48)	109.83	129.36	47.28	17.78	311.48	273.58	(12.17)
	Total	838.79	538.96	57.70	(35.75)	462.92	395.13	42.30	(14.64)	1301.71	934.09	(28.24)
North Carolina	Lumber & wood products	489.53	281.10	63.69	(42.58)	278.49	160.28	36.31	(42.45)	768.02	441.38	(42.53)
	Wood furniture	1153.81	573.94	66.06	(50.26)	582.70	294.85	33.94	(49.40)	1736.51	868.79	(49.97)
	Paper & allied products	612.37	609.82	60.15	(0.42)	330.31	404.08	39.85	22.33	942.67	1013.90	7.56
	Total	2255.70	1464.86	63.03	(35.06)	1191.50	859.21	36.97	(27.89)	3447.20	2324.07	(32.58)
Oklahoma	Lumber & wood products	63.89	38.57	65.41	(39.63)	39.70	20.40	34.59	(48.61)	103.59	58.97	(43.07)
	Wood furniture	51.14	27.93	67.25	(45.39)	28.07	13.60	32.75	(51.55)	79.21	41.53	(47.57)

Table 4.1 (continued)

	Paper & allied products	**74.18**	**110.30**	**58.14**	**48.69**	**43.33**	**79.43**	**41.86**	**83.31**	**117.51**	**189.73**	**61.46**
South Carolina	Total	189.21	176.79	60.92	(6.56)	111.09	113.43	39.08	2.11	300.30	290.22	(3.36)
	Lumber & wood products	190.00	166.80	58.81	(12.21)	114.98	116.81	41.19	1.59	304.98	283.61	(7.01)
	Wood furniture	84.40	56.19	60.98	(33.42)	44.15	35.95	39.02	(18.57)	128.55	92.14	(28.32)
	Paper & allied products	394.84	507.24	54.44	28.47	210.08	424.51	45.56	102.07	604.92	931.75	54.03
Tennessee	Total	669.24	730.23	55.85	9.11	369.21	577.27	44.15	56.35	1038.44	1307.50	25.91
	Lumber & wood products	260.24	150.84	61.65	(42.04)	129.18	93.82	38.35	(27.37)	389.43	244.66	(37.17)
	Wood furniture	400.77	205.13	64.23	(48.82)	171.50	114.26	35.77	(33.38)	572.26	319.39	(44.19)
	Paper & allied products	639.04	695.49	58.48	8.83	288.86	493.72	41.52	70.92	927.90	1189.21	28.16
Texas	Total	1300.05	1051.45	59.97	(19.12)	589.54	701.81	40.03	19.04	1889.59	1753.26	(7.21)
	Lumber & wood products	503.91	379.56	66.21	(24.68)	241.54	193.70	33.79	(19.81)	745.45	573.26	(23.10)
	Wood furniture	549.93	551.95	68.25	0.37	232.76	256.74	31.75	10.30	782.69	808.69	3.32
	Paper & allied products	774.30	859.72	63.38	11.03	358.32	496.77	36.62	38.64	1132.62	1356.49	19.77
Virginia	Total	1828.14	1791.23	65.41	(2.02)	832.62	947.21	34.59	13.76	2660.76	2738.44	2.92
	Lumber & wood products	350.18	208.31	67.96	(40.51)	188.91	98.20	32.04	(48.02)	539.09	306.51	(43.14)
	Wood furniture	433.80	267.37	70.10	(38.37)	206.03	114.04	29.90	(44.65)	639.83	381.41	(40.39)
	Paper & allied products	430.88	432.63	62.71	0.41	213.25	257.25	37.29	20.63	644.13	689.88	7.10
South	Total	1214.86	908.31	65.92	(25.23)	608.18	469.49	34.08	(22.80)	1823.05	1377.80	(24.42)
	Lumber & wood products	4029.55	2610.21	60.35	(35.22)	2241.41	1714.91	39.65	(23.49)	6270.96	4325.12	(31.03)
	Wood furniture	4145.54	2753.70	64.36	(33.57)	1985.15	1524.98	35.64	(23.18)	6130.69	4278.68	(30.21)
	Paper & allied products	5908.44	6299.49	56.78	6.62	3005.37	4794.23	43.22	59.52	8913.81	11093.72	24.46
	Total	14083.54	11663.40	59.21	(17.18)	7231.93	8034.13	40.79	11.09	21315.47	19697.53	(7.59)

*Tilley 2006 , Note: Numbers in parenthesis refer to negative change.

Table 4.2 Federal, non-defense taxes ($MM) generated by the forest products industry (FPI) in the U.S. South

State	FPI	Corporate Profit Tax		Indirect Business Taxes		Personal Taxes		Social Insurance Taxes		Total
		2009	% of total	2009	% of total	2009	% of total	2009	% of total	2009
Alabama	Lumber and wood products	20.99	9.20	14.61	6.40	49.57	21.72	143.08	62.69	228.25
	Wood furniture	14.71	8.98	9.20	5.62	34.21	20.88	105.71	64.52	163.83
	Paper and allied products	85.31	13.72	52.09	8.38	121.62	19.56	362.64	58.33	621.67
	Total	121.01	11.94	75.90	7.49	205.41	20.26	611.43	60.31	1013.75
Arkansas	Lumber and wood products	16.44	10.00	4.22	2.57	28.29	17.20	115.52	70.23	164.48
	Wood furniture	9.66	10.58	1.85	2.03	14.92	16.34	64.87	71.05	91.30
	Paper and allied products	49.33	15.06	9.91	3.03	50.27	15.35	217.96	66.56	327.46
	Total	75.43	12.93	15.98	2.74	93.49	16.03	398.35	68.30	583.24
Florida	Lumber and wood products	17.05	8.00	18.72	8.78	60.71	28.48	116.66	54.73	213.15
	Wood furniture	20.16	8.05	20.20	8.07	70.93	28.32	139.15	55.56	250.44
	Paper and allied products	54.99	11.07	50.05	10.08	133.87	26.95	257.83	51.90	496.74
	Total	92.19	9.60	88.97	9.26	265.51	27.65	513.65	53.49	960.32
Georgia	Lumber and wood products	33.35	9.92	35.49	10.55	89.08	26.49	178.37	53.04	336.30
	Wood furniture	23.63	10.23	21.71	9.40	60.60	26.23	125.09	54.14	231.04
	Paper and allied products	123.72	12.93	119.57	12.50	235.00	24.56	478.43	50.01	956.71
	Total	180.71	11.86	176.77	11.60	384.68	25.24	781.89	51.30	1524.05
Kentucky	Lumber and wood products	10.64	10.82	6.81	6.92	18.47	18.78	62.44	63.47	98.37
	Wood furniture	10.17	9.93	6.48	6.33	18.99	18.55	66.73	65.18	102.38
	Paper and allied products	31.00	12.61	20.37	8.28	42.83	17.42	151.68	61.69	245.88
	Total	51.81	11.60	33.66	7.54	80.29	17.98	280.85	62.88	446.62
Louisiana	Lumber and wood products	17.06	10.73	9.08	5.71	44.54	28.02	88.25	55.53	158.93
	Wood furniture	2.19	9.51	1.14	4.95	6.45	28.01	13.25	57.53	23.03
	Paper and allied products	40.28	13.81	20.90	7.17	75.56	25.91	154.89	53.11	291.63
	Total	59.53	12.57	31.12	6.57	126.55	26.72	256.39	54.14	473.60
Mississippi	Lumber and wood products	20.48	11.04	14.37	7.74	31.04	16.73	119.67	64.49	185.56
	Wood furniture	23.19	11.09	12.29	5.88	34.05	16.28	139.66	66.77	209.18
	Paper and allied products	20.55	14.25	13.95	9.67	22.21	15.40	87.50	60.67	144.22
	Total	64.22	11.92	40.61	7.53	87.31	16.20	346.83	64.35	538.96
North Carolina	Lumber and wood products	28.65	10.19	29.14	10.37	60.00	21.34	163.31	58.10	281.10
	Wood furniture	60.57	10.55	51.34	8.95	121.06	21.09	340.97	59.41	573.94
	Paper and allied products	65.96	10.82	76.23	12.50	123.86	20.31	343.76	56.37	609.82
	Total	155.18	10.59	156.72	10.70	304.92	20.82	848.04	57.89	1464.86
Oklahoma	Lumber and wood products	3.92	10.16	3.91	10.14	7.84	20.33	22.89	59.35	38.57
	Wood furniture	2.33	8.34	2.63	9.42	5.66	20.26	17.30	61.94	27.93
	Paper and allied products	15.26	13.83	15.85	14.37	19.83	17.98	59.35	53.81	110.30
	Total	21.51	12.17	22.39	12.66	33.34	18.86	99.55	56.31	176.79
South Carolina	Lumber and wood products	18.94	11.35	13.17	7.90	32.79	19.66	101.91	61.10	166.80
	Wood furniture	4.90	8.72	4.19	7.46	11.24	20.00	35.87	63.84	56.19
	Paper and allied products	70.63	13.92	49.28	9.72	92.98	18.33	294.36	58.03	507.24

Table 4.2 (continued)

	Total	**94.46**	**12.94**	**66.63**	**9.12**	**137.00**	**18.76**	**432.13**	**59.18**	**730.23**
Tennessee	Lumber and wood products	15.35	10.18	11.00	7.29	35.78	23.72	88.70	58.80	150.84
	Wood furniture	20.36	9.93	13.07	6.37	45.22	22.04	126.47	61.65	205.13
	Paper and allied products	88.20	12.68	58.30	8.38	145.42	20.91	403.56	58.03	695.49
	Total	123.91	11.78	82.38	7.83	226.42	21.53	618.74	58.85	1051.45
Texas	Lumber and wood products	41.02	10.81	41.48	10.93	122.01	32.15	175.06	46.12	379.56
	Wood furniture	52.42	9.50	54.54	9.88	178.91	32.41	266.08	48.21	551.95
	Paper and allied products	101.88	11.85	108.04	12.57	267.12	31.07	382.68	44.51	859.72
	Total	195.31	10.90	204.06	11.39	568.04	31.71	823.82	45.99	1791.23
Virginia	Lumber and wood products	19.53	9.38	18.28	8.78	69.33	33.28	101.17	48.57	208.31
	Wood furniture	23.75	8.88	20.99	7.85	87.77	32.83	134.85	50.44	267.37
	Paper and allied products	48.85	11.29	48.69	11.25	133.85	30.94	201.24	46.52	432.63
	Total	92.13	10.14	87.96	9.68	290.95	32.03	437.26	48.14	908.31
South	Lumber and wood products	263.42	10.09	220.30	8.44	649.47	24.88	1477.02	56.59	2610.21
	Wood furniture	268.03	9.73	219.63	7.98	690.01	25.06	1576.03	57.23	2753.70
	Paper and allied products	795.96	12.64	643.22	10.21	1464.43	23.25	3395.89	53.91	6299.49
	Total	1327.40	11.38	1083.15	9.29	2803.91	24.04	6448.95	55.29	11663.40

Table 4.3 State and Local Government, Non-Education Taxes ($MM) generated by the forest products industry in the U.S. South.

State	Forest Products Sector	Corporate Profit Tax		Dividends		Indirect Business Tax		Personal Taxes		Social Insurance Taxes		Total
		2009	% of total	2009	% of total	2009	% of total	2009	% of total	2009	% of total	2009
Alabama	Lumber and wood products	5.80	3.47	26.35	15.77	109.94	65.80	22.73	13.61	2.27	1.36	167.09
	Wood furniture	4.06	3.72	18.47	16.91	69.17	63.35	15.69	14.37	1.80	1.65	109.19
	Paper and allied products	23.57	4.03	107.11	18.33	391.87	67.07	55.77	9.55	5.96	1.02	584.29
	Total	33.42	3.88	151.93	17.65	570.98	66.35	94.19	10.95	10.04	1.17	860.57
Arkansas	Lumber and wood products	0.00	0.00	11.40	5.28	95.03	43.99	59.03	27.32	50.57	23.41	216.04
	Wood furniture	0.00	0.00	6.70	6.10	41.57	37.90	31.14	28.39	30.28	27.61	109.69
	Paper and allied products	0.00	0.00	34.21	7.38	222.99	48.10	104.89	22.63	101.48	21.89	463.57
	Total	0.00	0.00	52.31	6.63	359.59	45.56	195.06	24.71	182.34	23.10	789.30
Florida	Lumber and wood products	0.21	0.18	7.84	6.69	103.02	87.93	5.41	4.62	0.67	0.57	117.15
	Wood furniture	0.25	0.20	9.27	7.25	111.14	86.97	6.33	4.95	0.81	0.63	127.80
	Paper and allied products	0.68	0.22	25.29	8.03	275.37	87.49	11.94	3.79	1.48	0.47	314.75
	Total	1.14	0.20	42.40	7.58	489.53	87.46	23.68	4.23	2.96	0.53	559.71
Georgia	Lumber and wood products	1.30	0.66	15.21	7.68	159.08	80.33	21.18	10.69	1.27	0.64	198.04
	Wood furniture	0.92	0.74	10.78	8.67	97.32	78.27	14.41	11.59	0.91	0.73	124.34
	Paper and allied products	4.82	0.73	56.43	8.60	535.94	81.64	55.86	8.51	3.45	0.52	656.50
	Total	7.03	0.72	82.43	8.42	792.35	80.94	91.45	9.34	5.62	0.57	978.88

Table 4.3 (continued)

Kentucky	Lumber and wood products	5.54	6.68	10.16	12.24	45.47	54.79	21.12	25.45	0.70	0.84	82.99
	Wood furniture	5.30	6.56	9.71	12.03	43.21	53.54	21.72	26.91	0.77	0.96	80.71
	Paper and allied products	16.14	6.95	29.59	12.73	135.90	58.48	48.97	21.07	1.77	0.76	232.37
	Total	26.98	6.81	49.46	12.49	224.58	56.70	91.81	23.18	3.25	0.82	396.07
Louisiana	Lumber and wood products	16.07	14.12	4.02	3.53	83.58	73.43	7.03	6.18	3.12	2.74	113.83
	Wood furniture	2.06	14.14	0.52	3.54	10.50	71.96	1.02	6.97	0.50	3.40	14.60
	Paper and allied products	37.94	14.73	9.49	3.68	192.50	74.72	11.93	4.63	5.77	2.24	257.62
	Total	56.08	14.53	14.03	3.63	286.58	74.23	19.97	5.17	9.39	2.43	386.05
Mississippi	Lumber and wood products	4.41	3.23	25.33	18.55	90.26	66.09	15.35	11.24	1.21	0.88	136.56
	Wood furniture	5.00	3.87	28.68	22.20	77.17	59.73	16.84	13.03	1.52	1.17	129.21
	Paper and allied products	4.43	3.42	25.42	19.65	87.63	67.74	10.99	8.49	0.91	0.70	129.36
	Total	13.84	3.50	79.42	20.10	255.06	64.55	43.18	10.93	3.63	0.92	395.13
North Carolina	Lumber and wood products	3.84	2.39	21.17	13.21	121.73	75.95	12.05	7.52	1.48	0.92	160.28
	Wood furniture	8.11	2.75	44.77	15.18	214.47	72.74	24.31	8.24	3.19	1.08	294.85
	Paper and allied products	8.83	2.19	48.75	12.06	318.45	78.81	24.87	6.15	3.17	0.79	404.08
	Total	20.78	2.42	114.70	13.35	654.66	76.19	61.23	7.13	7.84	0.91	859.21
Oklahoma	Lumber and wood products	0.35	1.73	2.59	12.70	15.63	76.63	1.60	7.87	0.22	1.07	20.40
	Wood furniture	0.21	1.55	1.54	11.33	10.51	77.32	1.16	8.52	0.17	1.28	13.60
	Paper and allied products	1.38	1.73	10.09	12.71	63.32	79.71	4.06	5.11	0.58	0.73	79.43
	Total	1.94	1.71	14.23	12.54	89.47	78.87	6.82	6.02	0.97	0.86	113.43
South Carolina	Lumber and wood products	4.21	3.60	21.60	18.50	77.38	66.24	13.50	11.56	0.12	0.10	116.81
	Wood furniture	1.09	3.02	5.59	15.54	24.61	68.45	4.63	12.87	0.04	0.12	35.95
	Paper and allied products	15.69	3.70	80.58	18.98	289.59	68.22	38.29	9.02	0.36	0.08	424.51
	Total	20.98	3.63	107.77	18.67	391.58	67.83	56.41	9.77	0.52	0.09	577.27
Tennessee	Lumber and wood products	4.75	5.06	5.28	5.63	75.56	80.53	6.05	6.45	2.19	2.33	93.82
	Wood furniture	6.30	5.51	7.01	6.13	89.76	78.56	7.64	6.69	3.55	3.11	114.26
	Paper and allied products	27.28	5.53	30.36	6.15	400.25	81.07	24.58	4.98	11.26	2.28	493.72
	Total	38.32	5.46	42.64	6.08	565.57	80.59	38.27	5.45	17.00	2.42	701.81
Texas	Lumber and wood products	0.00	0.00	10.68	5.51	167.55	86.50	14.56	7.52	0.91	0.47	193.70
	Wood furniture	0.00	0.00	13.65	5.32	220.30	85.81	21.35	8.32	1.44	0.56	256.74
	Paper and allied products	0.00	0.00	26.53	5.34	436.37	87.84	31.88	6.42	1.99	0.40	496.77
	Total	0.00	0.00	50.86	5.37	824.22	87.02	67.80	7.16	4.34	0.46	947.21
Virginia	Lumber and wood products	0.00	0.00	11.61	11.83	83.19	84.71	2.82	2.87	0.58	0.59	98.20
	Wood furniture	0.00	0.00	14.12	12.38	95.55	83.79	3.57	3.13	0.80	0.70	114.04
	Paper and allied products	0.00	0.00	29.04	11.29	221.59	86.14	5.44	2.11	1.18	0.46	257.25
	Total	0.00	0.00	54.78	11.67	400.33	85.27	11.83	2.52	2.56	0.55	469.49

Table 4.3 (continued)

South	Lumber and wood products	46.48	2.71	173.26	10.10	1227.42	71.57	202.44	11.80	65.31	3.81	1714.91
	Wood furniture	33.30	2.18	170.79	11.20	1105.31	72.48	169.79	11.13	45.79	3.00	1524.98
	Paper and allied products	140.76	2.94	512.90	10.70	3571.75	74.50	429.46	8.96	139.36	2.91	4794.23
	Total	220.54	2.75	856.95	10.67	5904.48	73.49	801.70	9.98	250.46	3.12	8034.13

Table 4.4 Forest products industry's state and local government, non-education taxes SAM multipliers in the Southern U.S. by states and sectors.

State	Lumber and wood products	Wood furniture	Paper and allied products
Alabama	3.8345	4.4783	2.7897
Arkansas	2.9382	2.6420	2.8033
Florida	7.1617	9.7262	4.9251
Georgia	5.3935	6.9029	4.1935
Kentucky	3.2081	3.4379	2.8360
Louisiana	3.6205	5.2843	2.8768
Mississippi	3.4709	3.5520	2.4994
North Carolina	4.1387	5.4400	3.7137
Oklahoma	4.5341	5.6479	3.3377
South Carolina	3.5801	5.3595	3.0695
Tennessee	6.0789	6.5415	3.4979
Texas	5.6333	9.0099	4.9586
Virginia	4.5858	6.4598	3.6164

Table 4.5 Forest products industry's federal government non-defense taxes SAM multipliers in the Southern U.S. by states and sectors.

State	Lumber and wood products	Wood furniture	Paper and allied products
Alabama	2.3909	2.1130	2.5143
Arkansas	2.3081	1.8967	2.3039
Florida	3.2183	2.6917	3.2232
Georgia	2.7864	2.5057	2.9806
Kentucky	2.1334	2.0260	2.1676
Louisiana	2.2856	2.1476	2.4057
Mississippi	2.2884	1.7673	2.1217
North Carolina	2.4702	2.2062	2.6350
Oklahoma	2.1367	2.0836	2.6101
South Carolina	2.3054	2.2205	2.3721
Tennessee	2.8122	2.2920	2.6408
Texas	2.7541	2.6704	2.9822
Virginia	2.3652	2.1513	2.6825

Table 4.6 Forest products industry's combined (federal government and state and local) tax SAM multipliers in the Southern U.S. by states and sectors.

State	Lumber and wood products	Wood furniture	Paper and allied products
Alabama	2.8433	2.6789	2.6406
Arkansas	2.6281	2.2419	2.5725
Florida	3.9994	3.5621	3.7221
Georgia	3.3945	3.2244	3.3782
Kentucky	2.5197	2.4739	2.4479
Louisiana	2.7012	2.7899	2.6059
Mississippi	2.6747	2.1868	2.2850
North Carolina	2.8938	2.7638	2.9800
Oklahoma	2.6152	2.6263	2.8722
South Carolina	2.7016	2.8782	2.6460
Tennessee	3.5422	2.9860	2.9399
Texas	3.3290	3.4385	3.4919
Virginia	2.7996	2.6872	2.9684

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CHAPTER V

CONCLUSION

The overall objective of this study was to estimate the impact of the forest products industry on the South's economy using 2009 IMPLAN data and to determine changes in economic contributions since 2001. Results suggest that the forest products industry is an important contributor to the South's economy and its contributions have contracted substantially due to the recent recession and the sharp decline in housing starts and other constructional activities. Although the industry's direct impacts decreased, SAM multipliers for the industry increased for all states. This suggests that even though the direct contributions of the industry were severely affected by the economic downturn, the industry still played an eminent role in economic activity through its secondary contributions. In addition, average annual earnings of the industry were higher than that of the South-wide average. To this end, Chapter II illustrated the importance of the forest products industry to the South's economy in light of different attributes like employment, income, output, value-added, and SAM multipliers.

Chapter III illustrated the increase in the industry's value of shipments and manufacturing value-added and decrease in employment and earnings in real terms. This indicated that the industry has reduced its profit margin in order to maintain its production during the downturn. In absolute terms, states with larger economies like Texas, North Carolina, and Georgia had large forest products industries but they

accounted for the lowest percentage of their respective state economies whereas in states with small economies, like Mississippi, the industry accounted for a larger percentage of the total state economy. This suggests that states with smaller economies are more dependent on the forest products industry. Manufacturing value-added as a percentage to GSP increased for all thirteen states except for Virginia. This indicates that economic contributions of the forest products industry grew faster than that of other industries. The forest products industries' tax contributions were also negatively impacted (-7.6%) by the economic downturn. Findings from Chapter IV illustrated sectors and the tax types that were most affected by economic cycles.

In summary, findings of this study indicated that the economic contributions of the forest products industry were substantially impacted from 2001 to 2009; nonetheless; it is a major contributor to the South's economy. Comparison among thirteen southern states and sectors will help identify economically sound states and sectors as attractive places to invest. Information on tax contributions will help policy makers predict tax impacts and help plan accordingly to improve or stabilize tax revenues. Findings of this study provide baseline economic information about the South's forest products industry which is so important for policy formation. This study should be periodically updated to identify industry trends over time. Such information will be helpful in understanding important economic issues pertaining to the forest products industry. Thus, continuous future research is recommended.

Future research should investigate sources of change impacting the forest products industry and assess the degree of impact associated with each in order to better identify actions necessary to support the industry. Likewise, emerging opportunities for

southern forest-based industries should be integrated into impact assessment so that full benefits of forest resources can be documented and incorporated into the forest industry's economic impacts. Similarly, future research works should also incorporate non-market benefits associated with South's forest along with market benefits such as environmental services, recreation, fishing, and wildlife watching which help policymakers to emphasize on both sectors equally and help enhance total economic contributions of forest-based industries.

Although this study met all of its objectives, there is a limitation to be noted. This study is based on single year's data (2009) and economic impacts of the forest products industry in that year were no doubt limited due to the decline in the forest products industry following the recession of 2007-2009. As a result, these findings may not represent true economic impacts to the South that would be observed in other years or over time. Thus, industry trends would be more precise if several years of IMPLAN data were used. Nonetheless, this study provides insight into the impacts of the forest products industry to the South's economy.

APPENDIX A

IMPLAN OUTPUTS

Table A.1 2009 IMPLAN database deflators 2009 to 2001 dollars.

State	All	Lumber and wood products	Paper and allied products	Wood furniture	FBI
Alabama	0.817	0.901	0.790	0.864	0.817
Arkansas	0.758	0.916	0.817	0.857	0.848
Florida	0.807	0.894	0.814	0.863	0.836
Georgia	0.808	0.902	0.802	0.864	0.827
Kentucky	0.792	0.907	0.816	0.875	0.844
Louisiana	0.643	0.889	0.794	0.869	0.822
Mississippi	0.745	0.895	0.802	0.849	0.853
North Carolina	0.815	0.894	0.795	0.854	0.825
Oklahoma	0.704	0.913	0.802	0.866	0.828
South Carolina	0.795	0.888	0.815	0.870	0.832
Tennessee	0.798	0.893	0.802	0.860	0.818
Texas	0.739	0.889	0.810	0.857	0.832
Virginia	0.803	0.902	0.793	0.866	0.833
South	0.775	0.898	0.804	0.859	0.830

Table A.2 Relative rank of each southern state in terms of 2001 southern forest-based employment, earnings, value of shipments, and value-added and average state rank (Tilley 2006).

State	Rank				
	Employment	Earnings	Value of shipments	Value-added	Average rank
Alabama	4	3	2	1	2.50
Arkansas	2	1	1	2	1.50
Florida	13	13	7	8	10.25
Georgia	8	8	4	5	6.25
Kentucky	6	7	10	7	7.50
Louisiana	10	9	8	4	7.75
Mississippi	1	2	3	3	2.25
North Carolina	3	4	11	12	7.50
Oklahoma	12	12	12	11	11.75
South Carolina	7	5	5	6	5.75
Tennessee	5	6	9	10	7.50
Texas	11	11	13	13	12.00
Virginia	9	10	6	9	8.50

Table A.3 Relative rank of each southern state in terms of 2009 southern forest-based employment, earnings, value of shipments, and value-added and average state rank.

State	Rank				
	Employment	Earnings	Value of shipments	Value-added	Average rank
Alabama	3	3	3	2	2.75
Arkansas	2	2	1	1	1.50
Florida	13	13	8	10	11.00
Georgia	8	8	4	4	6.00
Kentucky	7	7	7	5	6.50
Louisiana	10	9	12	7	9.50
Mississippi	1	1	6	6	3.50
North Carolina	4	6	9	12	7.75
Oklahoma	12	12	11	8	10.75
South Carolina	5	4	2	3	3.50
Tennessee	6	5	10	9	7.50
Texas	11	11	13	13	12.00
Virginia	9	10	5	11	8.75