

Economic Base Assessment of Beaufort County, South Carolina

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Economic Background

The major economic forces in Beaufort County since the late 19th century have been in the agriculture and forestry industries, as well as government institutions.¹ Family operated farms began to dot the landscape in the late 1800s as the region's large cotton plantations were divided and replaced by small truck farms. The truck farms, which cultivated vegetables for shipment via the region's well-defined rail connections to the north, flourished until mid-century when farming profitability started to fall throughout the nation. As agriculture declined silvaculture emerged within the state and became a major industry in Beaufort County. Significant agricultural holdings were converted and added to existing tracts of timbered land to create a number of large-scale timber companies. Today, few family farms remain, the majority of which have ceased to operate, and the agricultural industry is characterized by a small number of domestic export agri-business firms located on St. Helena Island. In recent years timbering operations have declined as well and the remaining companies have largely centered on growing pine to supply coastal paper mills, but as of late, interest has been moving even further away from harvesting and more toward land development.

Government influence on the economy by way of military presence began in the late 1800s as well and has fluctuated over the last one hundred years in sync with macro political trends. However, it has remained a permanent influence by some degree since 1915 when the Marine Corps established one of its two training depots on Parris Island. In addition to the Parris Island installation the county is home to a naval hospital, a Marine Corps Air Station, and a large military housing complex. These installations are located nearest the Port Royal community and have therefore been major contributors to housing development and business growth in that area since their formal creation in the 1950s.

Other business and residential development prior to the 1950s was slowed by the poor quality or lack of internal transportation linkages in the area, particularly paved roads on the mainland and bridges to the islands and between the northern and southern portions of the county. In the mid- to late-1950s major road improvements were made and several bridges built,

¹ Economic history summarized from the Beaufort County Comprehensive Plan, 1997 Update, Chapter 1 *Historical Perspective*, Beaufort County Planning Department <<http://www.co.beaufort.sc.us/Council/goals2001.htm>> Accessed 05/31/01.

including one that connected Hilton Head Island to the mainland. By 1960 development of resort and retirement communities began on Hilton Head and has continued since, leading to economic stimulation through support economies and similar housing developments in both the southern and northern parts of the county.

Yet, even as the Beaufort County economy continues to flourish there is concern for the region's future. The continual growth of Hilton Head and the surrounding area has put increased pressure on the county's natural and historic resources. In addition, there is a growing disparity among county residents due to the influx of affluent retirees, and long-term residents that do not have access to similar economic resources. Therefore, not only sustainable economic growth, but also equitable growth is sought. An analysis of how the county economy has changed over time, where it stands today, and how it will likely be structured in the near future is integral to understanding the potential for that growth.

Trend Analysis of Economic Base

A region's wealth is a function of its resources and the ability to utilize those resources in a sustainable manner to produce income. Income is maintained and generated in a number of ways, such as: through the conversion of resources to commodities by local businesses and the selling of those commodities to customers outside the region, the attraction of new customers or businesses into the region, capture of local demand for goods and services, and obtainment of government transfers. The purpose of an economic base study is to define the linkages between local resources and income that flows from outside to inside the region in order to identify current and potential factors of economic growth. However, as indicated, economic systems are comprised of circular rather than linear flows. A regional economy consists of export producers, businesses that support export producers as well as residents, and a resident population that buys both locally and externally produced goods and services. Thus, all contribute to a region's economy and must be considered in the analysis. Indicators of economic growth and stability examined in this section include historical changes in population, employment, industry structure, income, and earnings. The relationships among those factors are further defined in the second part of this work, which consists of an input-output analysis of Beaufort County's economic base.

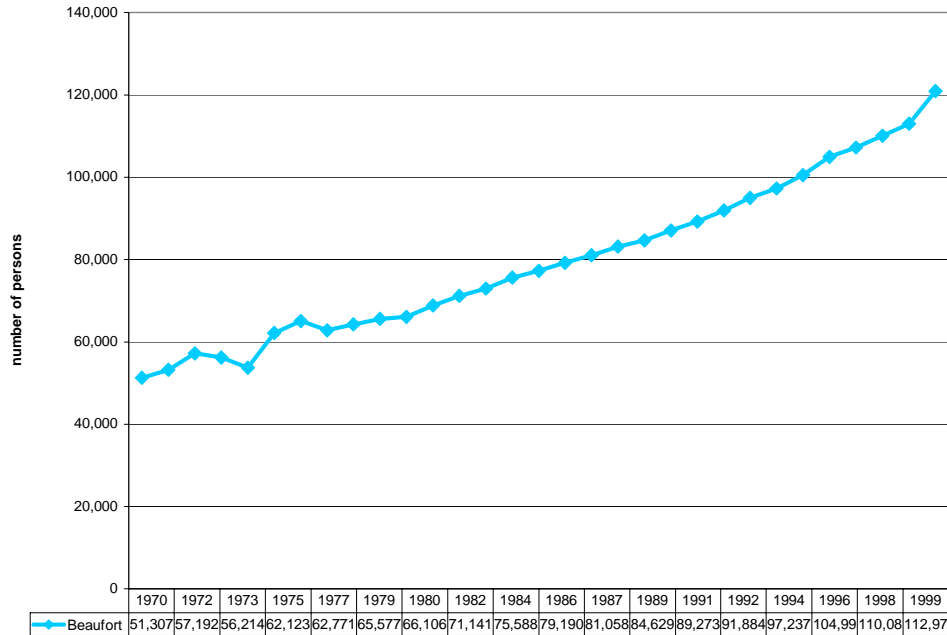
Population

Maintaining a healthy economy requires a stable or growing population, to work and consume and thereby support economic activity. A changing population is a reflection of a region's ability to attract and retain resident consumers and producers over a given period of time. Therefore population change is an indirect measure of past and potential economic prosperity. The following figures summarize population change for Beaufort County, South Carolina from 1970 to 2000 and compare it to population change rates for the State of South Carolina and the United States (Figures 1, 3 and 4). A breakdown of county population change by designated planning regions is also provided (Figure 2).

Between 1970 and 2000, Beaufort County's population increased by 57.6 percent or 69,630 persons while the population for the State of South Carolina grew by 35.2 percent or an average of 30,735 persons per county. State growth as a whole was greater than that of the nation, which increased by 27.6 percent during the same period. However, in the last two decades the state and the nation have grown at relatively the same rate, while percent change in county population has been significantly greater. During the 1990 to 2000 period alone, state change was 12.8 percent and the national change rate was 13.1 percent, while Beaufort County grew by more than twice that rate with a 28 percent change. The result is a county population more than double its 1970 level at 120,937 in 2000 compared to 51,307 in 1970 (*see* Figure 1).

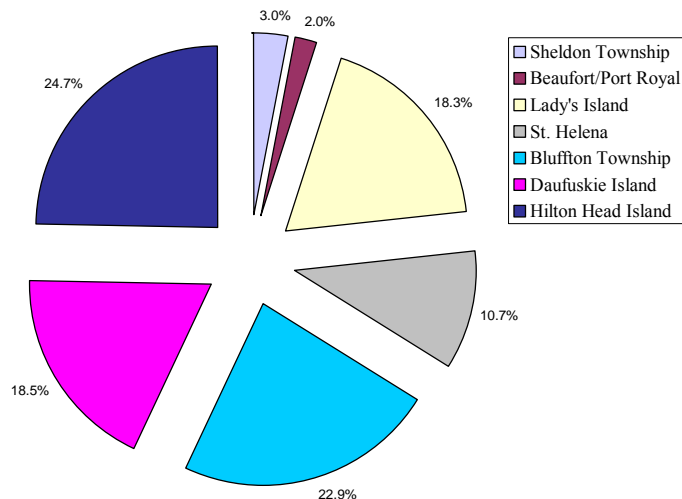
The majority of that growth from 1980 to 1990 was in the southern portion of the county, particularly on Hilton Head Island and in Bluffton Township. During that decade the population of Hilton Head grew by 52 percent or 24.7 percent of total county growth and Bluffton's population increased by 48 percent or 22.9 percent of total county growth (*see* Figure 2). Hilton Head has maintained its position as the second largest planning region in Beaufort County with 16.9 percent of the county population in 1980 and 26.8 percent in 1990. The largest region however, Beaufort/Port Royal, which includes the City of Beaufort, incorporated and unincorporated portions of Port Royal, and military installations, suffered a population loss during the same period, moving from 58 percent to 46 percent of the county total.

Figure 1. Population; Number of Persons; Beaufort Co., SC; 1970-2000



Data Source: Bureau of Economic Analysis, Regional Accounts Data, Local Area Personal Income, CA1-3 Population, Number of Persons.

Figure 2. Population Change by County Planning Area; Percent of Total County Change; Beaufort Co., SC; 1980-1990

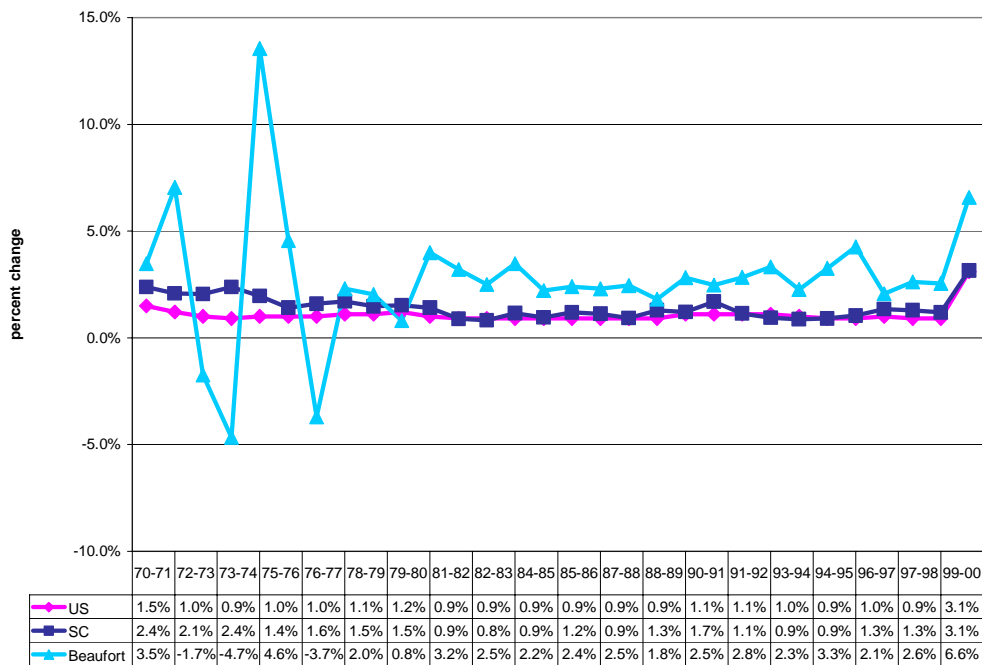


Data Source: Beaufort County Planning Department, Beaufort County Comprehensive Plan, 1997 Update, Table 7. Population by Planning Area, 1960-1990

Overall, yearly statewide population change has closely resembled that of the nation, with relatively steady growth over the course of the last thirty years and a more recent jump in growth rates exhibited in the 2000 Census statistics. Beaufort County, on the other hand, had sporadic rates of change from year to year from the early to late 1970s and slightly variable positive growth since. This is suggested in Figure 3, which shows the absolute yearly change rates for Beaufort County as well as South Carolina and the United States.

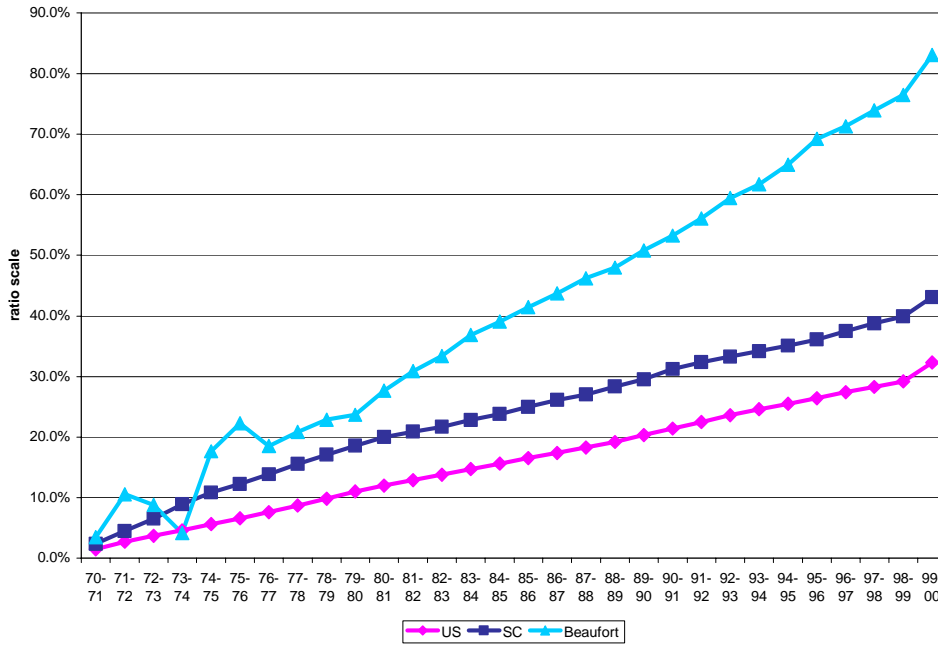
The rapidity and periodicity of that change is made clearer in Figure 4, whereby population change is plotted on a ratio scale so that the slope of the line represents per annum growth. By looking at the relative slope of the lines and distance between point markers the difference in growth rates at various times for Beaufort County is immediately apparent. So too are the points of divergence and convergence with the state and nation. An examination of employment may help explain why the county has increasingly been moving away from the rest of the state and nation as shown.

Figure 3. Population; Absolute Percent Change; U.S., SC, & Beaufort Co., SC; 1970-2000



Data Source: Bureau of Economic Analysis, Regional Accounts Data, Local Area Personal Income, CA1-3 Population, Number of Persons.

Figure 4. Population; Relative Percent Change; U.S., SC, & Beaufort, Co., SC; 1970-2000



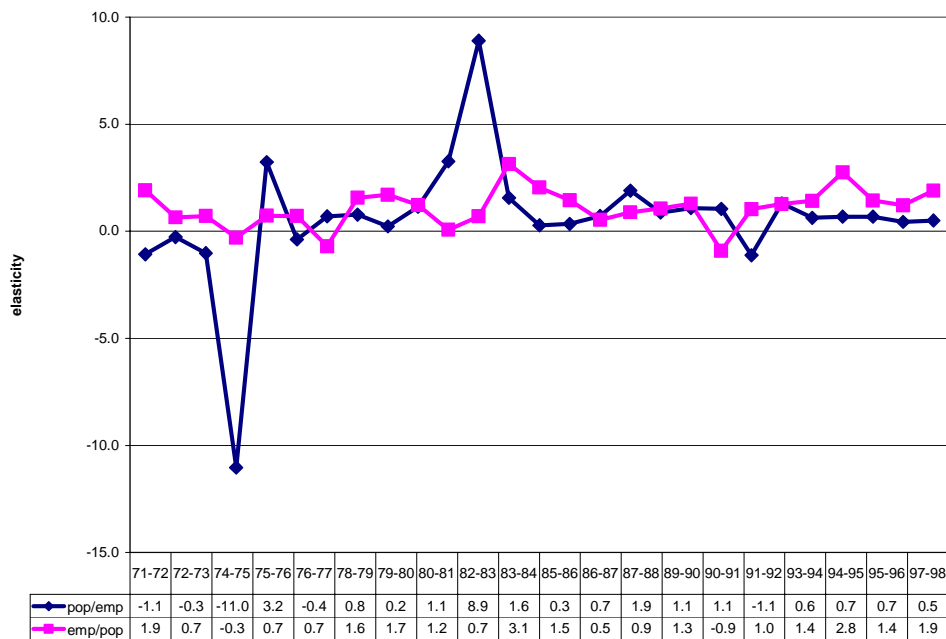
Data Source: Bureau of Economic Analysis, Regional Accounts Data, Local Area Personal Income, CA1-3 Population, Number of Persons.

Employment

Traditionally, it is understood that changes in population reflect changes in employment opportunity in a region. However, it has also been suggested that the reverse is true where quality of life factors rather than employment draw individuals to an area. In the latter case economic growth takes place to meet the demands of an increasing population. As expressed earlier, this is believed to be indicative of the situation in Beaufort County as job creation has likely resulted from the in-migration of retirees and others seeking an environment with a particular bundle of amenities that are not work related. Historical change in Beaufort county supports such a scenario until the mid- to late-1970s, but overall, employment change seems to be tied more so to trends in the national economy rather than regional population change. The following figures provide greater detail as to the make-up of the transitions in Beaufort County employment since 1970 and information pertaining to the relationship of those changes to county population and state and national employment rates (Figures 5-8).

Figure 5 compares population and total employment change rates from 1970 to 1998 by way of elasticity measures. Elasticity is a concept that measures the responsiveness or sensitivity of one variable to another. A value equal to one is referred to as unit elasticity or proportional change, while a value greater than one is elastic and less than one, inelastic.² Both population and employment change in the county compared to each other for the prior year show fluctuating measures of elasticity over time, but two significant trends are clear.³ During the 1974 to 1975 period population was extremely insensitive to changes in employment while the opposite was true for 1982 to 1983, which is typical given the relative stage of the business cycle in conjunction with national productivity levels and employment opportunity.

Figure 5. Population and Employment Elasticity; Lagged ($\Delta X/\Delta Y_{t-1}$); Beaufort Co., SC; 1970-1998



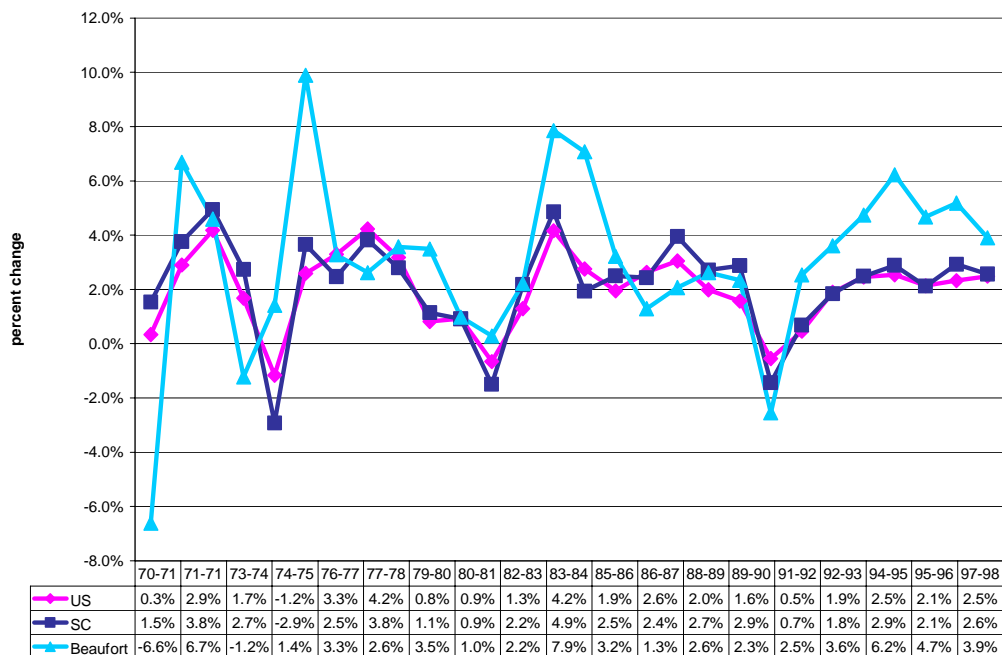
Data Source: Bureau of Economic Analysis, Regional Accounts Data, Local Area Personal Income, CA1-3 Population, Number of Persons and CA25- Total Full- and Part-time Employment by Industry

² Elasticity measure = $\Delta X/\Delta Y$. Unit elasticity ($\Delta X=\Delta Y$); Elastic ($\Delta X>\Delta Y$); Inelastic. ($\Delta X<\Delta Y$)

³ Lagged ($\Delta X/\Delta Y_{t-1}$)

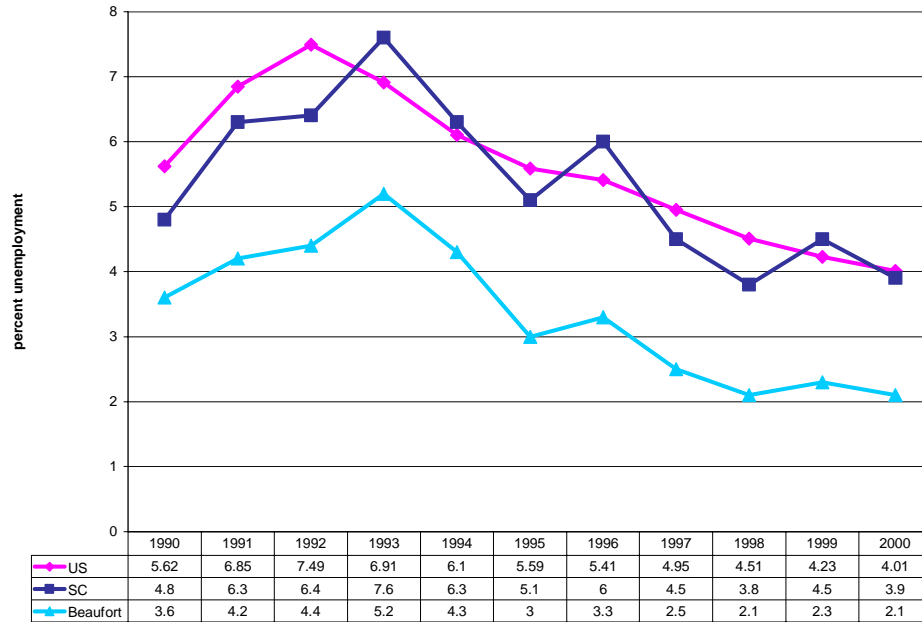
However, growth in total employment in Beaufort County exceeded that of both the state and nation. County employment increased by 58.8 percent from 1970 to 1998 compared to a 46.2 percent increase in the state and 43 percent growth in the nation for the same time period (see Figure 6). Between 1990 and 1998 Beaufort County's employment increased by 25.2 percent while both the state and nation also grew, but to a significantly lesser degree than Beaufort (13.3 percent and 13 percent, respectively). This growth of jobs in the county compared to the state and nation is also evident by looking at unemployment rates, which averaged 3.4 percent for the county, 5.4 percent for the state, and 5.6 percent for the nation from 1990 to 2000 (see Figure 7). Yet, wage and salary jobs as a percent of total full-time and part-time employment peaked in 1970 in Beaufort at 95.6 percent. At that time the county was 7.4 percent greater than the state and 9.3 percent above the nation, but has since declined by 8.9 percent and currently trends with the state (see Figure 8). This pattern can be better understood in relation to changes in county industry structure.

Figure 6. Percent Change in Total Full-time & Part-time Employment; U.S., SC, & Beaufort Co., SC; 1970-1998



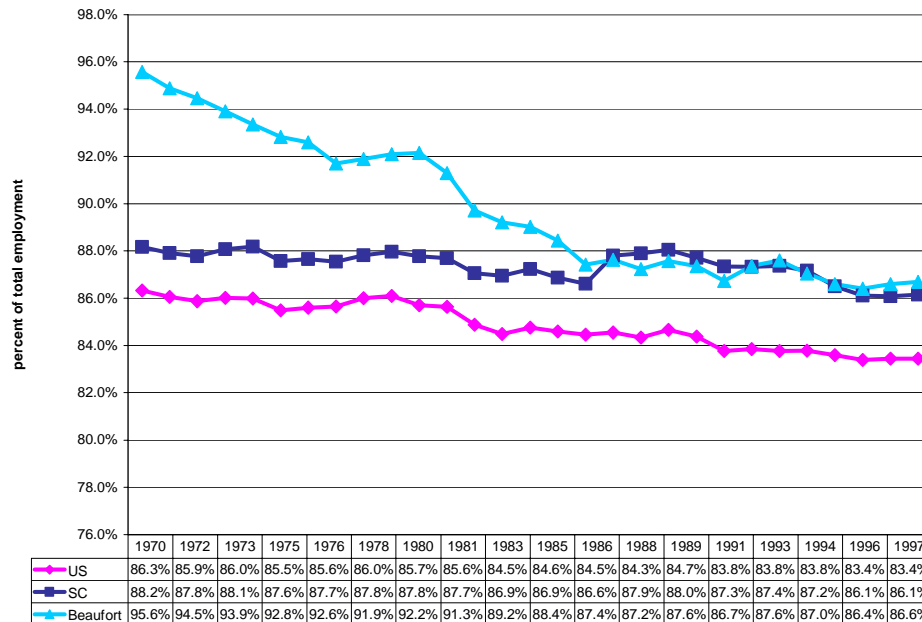
Data Source: Bureau of Economic Analysis, Regional Accounts Data, Local Area Personal Income, CA25- Total Full- and Part-time Employment by Industry.

Figure 7. Unemployment Rate; Monthly Average; U.S., SC, & Beaufort Co., SC; 1990-2000



Data Source: Bureau of Labor Statistics, Local Area Unemployment Statistics, Unemployment Rates, NSA.

Figure 8. Total Wage & Salary Employment; Percent of Total Full- & Part-time Employment; U.S., SC, & Beaufort Co., SC; 1970-1998



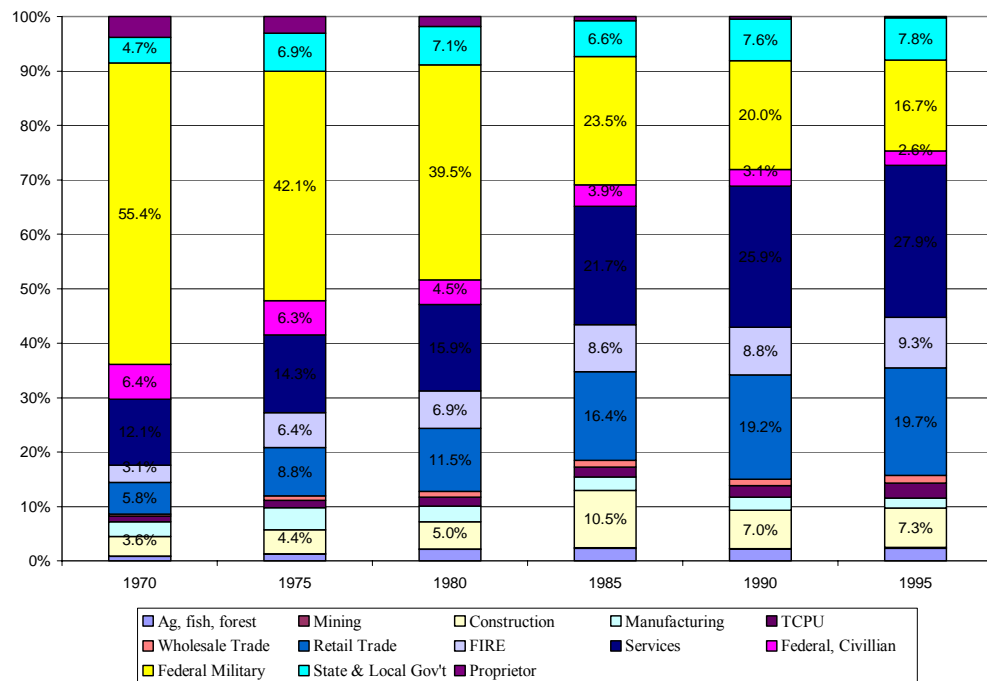
Data Source: Bureau of Economic Analysis, Regional Economic Information System, County Level Variables, CA25- Total Full- and Part-time Employment by Industry.

Industry Structure

Changes in the activity-mix of the region can be measured by focusing on the relative importance of each industry. That relationship to total employment in the county between 1970 and 1995 is examined (Figures 9 and 10) as well as the concentration of that employment in comparison to the nation (Table 1). A preliminary discussion of import/export activity in conjunction with industry employment is also offered, but this is better explained by way of the input-output analysis that follows the trend analysis.

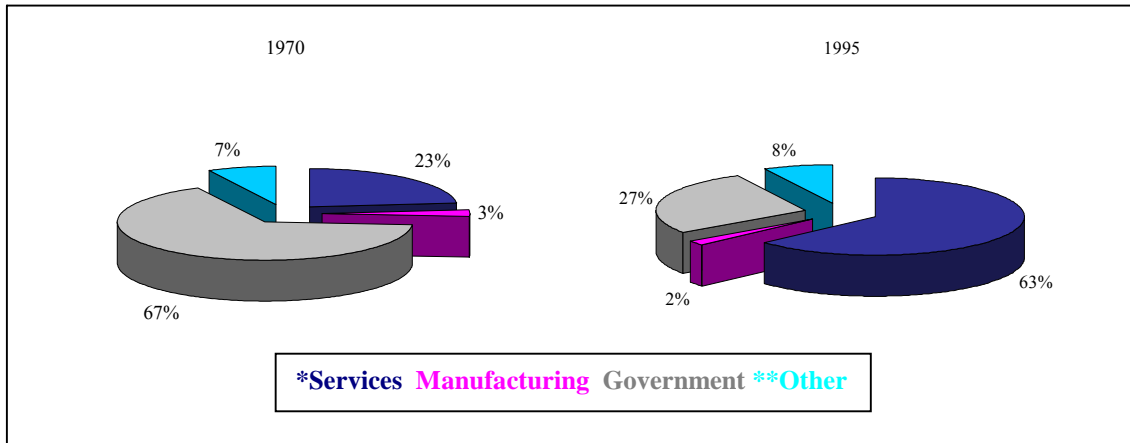
Percent employment by industry, as shown in Figure 9, reveals that the Federal government was the leading employer in Beaufort County until the 1990s, at which time services became the dominant industry. Other changes include growth in retail employment and FIRE (Finance, Insurance, and Real Estate), all of which would be expected in conjunction with an increasingly retiree and tourist based economy, and a transition in both military and Federal civilian employment representative of national military downsizing (*see* Figure 10).

Figure 9. Percent Total Full- & Part-time Employment by Industry; Beaufort Co., SC; 1970, 1975, 1980, 1985, 1990, & 1995



Data Source: Bureau of Economic Analysis, Regional Economic Information System, County Level Variables, CA25- Total Full- and Part-time Employment by Industry.

Figure 10. Industry Sector Employment; Percent Total Employment; Beaufort Co., SC; 1970 & 1995



*Services are broadly defined in this figure, consisting of agriculture, fishing, & forestry services, TCPU, wholesale & retail trade, FIRE, and other services based on USDA Economic Research Service service-dependent county designation. **The Other category consists of all industries not included in services, manufacturing, and government.
Data Source: Bureau of Economic Analysis, Regional Economic Information System, County Level Variables, CA25-Total Full- and Part-time Employment by Industry.

In general, Beaufort County's industry has become increasingly more diversified and less dependent on Federal military employment since the early to mid-1980s. This becomes clearer when examining the series of location quotients given in Table 1, which represent the percentage of population employed in each industry in the county to the corresponding percentage for the nation in the same year.⁴ For example, the location quotient for FIRE in 1970, .3235 or 32.4 percent, tells us that Beaufort County had a significantly less than proportional concentration of FIRE employment at that time compared to that of the nation.⁵ Reading across for the same industry, the coefficient rises to 1.1176 in 1995, indicating a more than proportional representation of FIRE in the region to the U.S. (12 percent greater).

Another use of the location quotient comes from recognizing that industry activities in a region supply both a local market and an external or export market and the desire to estimate how much of each activity is for export consumption. The simplest way to make such estimates is to use location quotients in conjunction with the basic/non-basic industry concept.⁶ The idea is

⁴ The location quotients were obtained by dividing employment in each sector for the region by total regional employment ($E_i/\sum E_{i-n}$). The same was done for the United States and the resultant decimals were divided into those derived for the region.

⁵ Assumes even distribution of industry activity across geographic areas.

⁶ Location quotients used in this manner assume homogenous consumption patterns, constant labor productivity across regions, and that local demands are first met by local production.

that some regional activities (basic) lead to growth while others (non-basic) are simply consequences of growth. In other words, a region, like a business, must earn its livelihood by producing something for which there is a willingness to pay by others. Economic activities that serve the local market are simply the result of the level of income and demand achieved in the past and as such, they are participants in growth but not the motivating factors of that growth. On the other hand, activities that serve an external market provide the means for generating income. A useful example is the difference between subsistence farming and commercial farming. That which is generated for consumption by the farmer alone cannot advance the economic position of that farmer, but production in excess of primary needs provides the opportunity for the generation of wealth (given market demands for farm product).

Table 1. Location Quotients; County Industry Sector Compared to U.S.; Beaufort Co., SC; 1970, 1975, 1980, 1985, 1990, & 1995

Industry Sector	1970	1975	1980	1985	1990	1995
Ag, Fishing, Forestry	1.0553	1.4447	2.0686	2.1525	1.8124	1.7554
Mining	0.0409	0.0383	0.0243	0.0346	0.0978	0.1519
Construction	0.5179	0.7037	0.7698	1.7173	1.1675	1.2421
Manufacturing	0.0878	0.1577	0.1189	0.1329	0.1498	0.1295
TCPU	0.0628	0.1281	0.1607	0.1984	0.2032	0.2669
Wholesale Trade	0.2705	0.4304	0.5582	0.8500	1.0137	1.0359
Retail Trade	0.2705	0.4304	0.5582	0.8500	1.0137	1.0359
FIRE	0.3235	0.6475	0.6858	0.9591	0.9891	1.1176
Services	0.4532	0.5224	0.5487	0.7314	0.8091	0.8263
Government	2.6289	2.3355	2.3569	1.8635	1.7512	1.6556
Federal, civilian	1.3959	1.6017	1.3010	1.3814	1.1613	1.1798
Military	10.8868	11.7173	13.6683	9.0211	8.8907	9.6341
State and local	0.3036	0.4275	0.4623	0.5134	0.6033	0.6259

Data Source: Bureau of Economic Analysis, Regional Accounts Data, Local Area Personal Income, CA25- Total Full- and Part-time Employment by Industry.

A location quotient greater than one suggests that the area economy has more than enough employment in that industry to supply the region with the amount of industry product demanded while also having a surplus of employment (i.e. production of goods/services) that can be sold outside of the region. Such industries are defined as basic and benefit the local economy by drawing dollars into the area from the outside, thus contributing to total county wealth. A location quotient less than one is interpreted as an industry that does not provide the necessary level of employment to produce that which is required to maintain normal consumption patterns.

This is referred to as a non-basic industry, which leads to the importation of goods and services, and is therefore a source of loss or leakage of wealth from the region.⁷

According to Table 1, all industries except for agriculture, fishing, and forestry services and the Federal government have historically been sources of leakage for Beaufort County. However, since the national economic upturn of the 1980s, Beaufort has seen an expansion in its basic industries, which as of 1995 were approximately double those of 1970. In addition, although services was shown to be the dominant employment industry in 1995 (*refer to Figure 9*), that industry remains less than proportional in representation compared to the average across the nation. Yet, these can only be thought of as rudimentary measures since location quotients only estimate net surpluses over area consumption for aggregated industries.⁸ However, they are helpful in gaining an initial understanding of the efficiencies and deficiencies of industry make-up over time as they pertain to regional growth.

Income

Income serves as one of the main indicators of regional economic prosperity. While there are multiple measures of income, the one most widely used in tracking growth is personal income.⁹ Per capita income, in addition to total personal income, can be used as scale measures of a region's economic health and that of the individuals that reside there. The following figures illustrate income in Beaufort County in both current and real dollars and in comparison to change in income for the nation and state (Figures 11-14). Sub-county per capita income and percent black population by planning area for 1990 are also given (Figures 15 and 16).

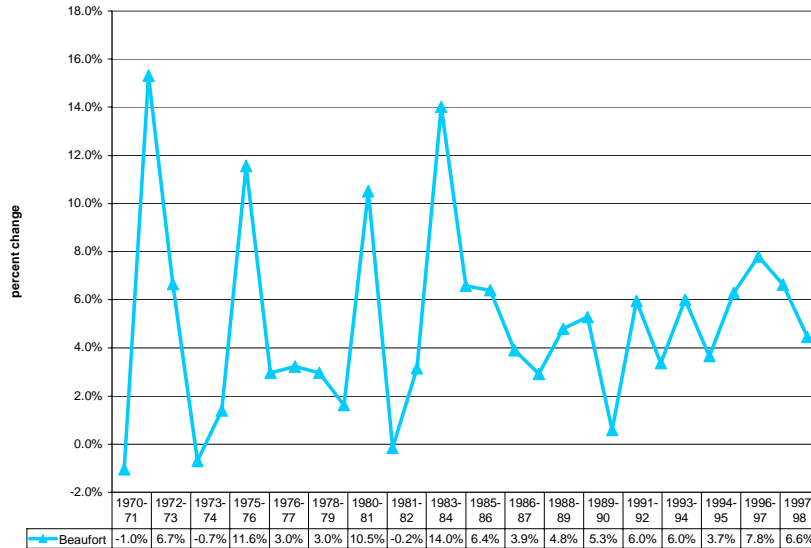
Annual change in personal income in Beaufort County, South Carolina was highly variable until the late 1980s (*see Figure 11*). Since then it has continued to fluctuate, but to a lesser degree than in the past while at the same time increasingly diverging from the state and nation in relative terms (*see Figure 12*).

⁷ Leakages are payments made to imports or value added sectors that do not re-spend the dollars in the region.

⁸ The under-estimation of a region's gross exports are likely due to factors of aggregation and previously noted assumptions in reference to consumption and production patterns.

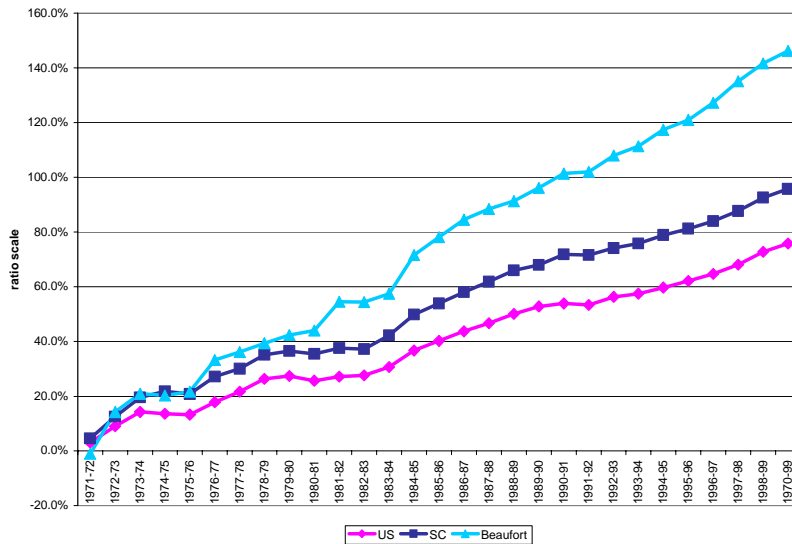
⁹ Personal income, as defined by the U.S. Department of Commerce, Bureau of Economic Analysis, is the sum of wages and salaries, dividends, rents, and interests, transfer payments, other labor income, and income of proprietors.

Figure 11. Personal Income; Real (2000) Change; Thousands of Dollars; Beaufort Co., SC; 1970-1999



Data Source: Bureau of Economic Analysis, Regional Accounts Data, Local Area Personal Income, CA05 Personal Income by Major Source and Earnings by Industry,

Figure 12. Personal Income; Real (2000) Relative Change; Thousands of Dollars; U.S., SC, & Beaufort Co., SC; 1970-1999

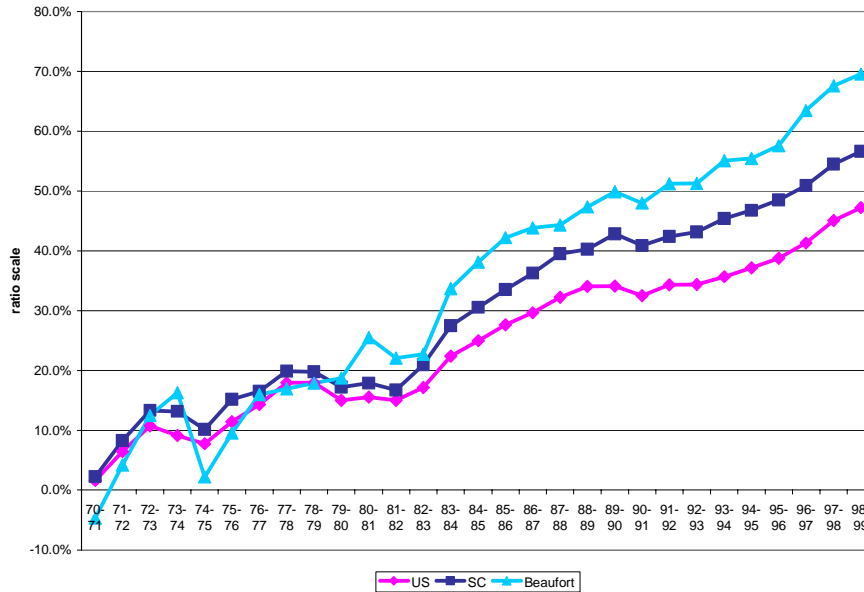


Data Source: Bureau of Economic Analysis, Regional Accounts Data, Local Area Personal Income, CA05 Personal Income by Major Source and Earnings by Industry,

Per capita income for Beaufort County in 1999 was 32,699 dollars, an 18.2 percent increase since 1990 when adjusted for inflation (*see* Figure 13). This is well above the 23,538 state and 28,546 national dollar values. In fact, per capita income for Beaufort County has remained at a rate between 100 and 115 percent of the U.S. since 1984, while the state has

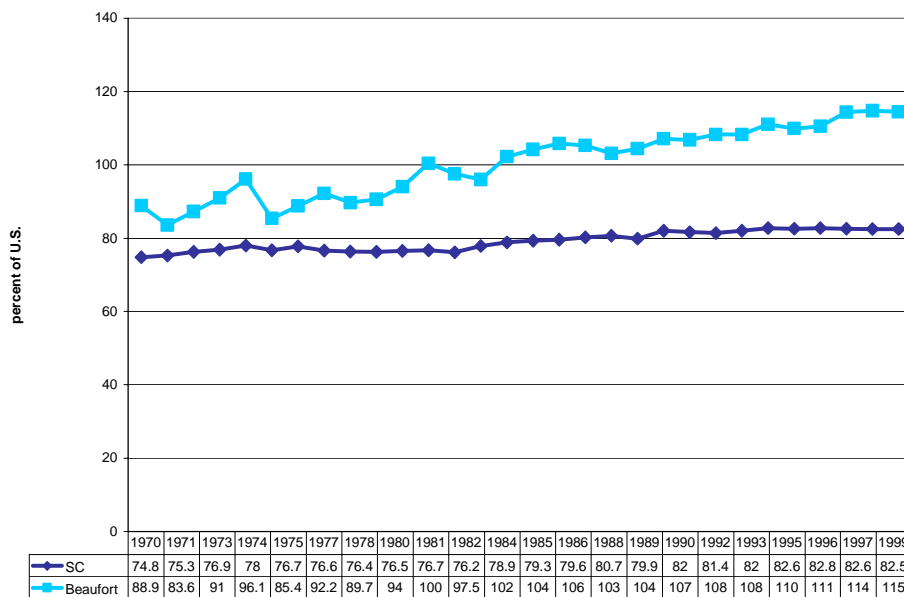
maintained a fairly steady proportional rate with the nation at an average rate of 79 percent since 1970 (see Figure 14).

Figure 13. Per Capita Income; Relative Change; Real (2000) Dollars; U.S., SC, & Beaufort Co., SC; 1970-1999



Data Source: Bureau of Economic Analysis, Regional Accounts Data, Local Area Personal Income, CA1-3 Per Capita Personal Income, Percent of U.S.

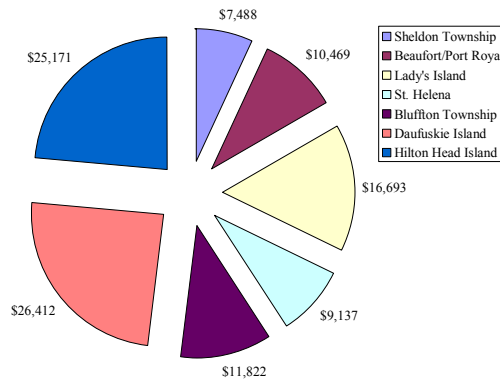
Figure 14. Per Capita Income as a Percent of the U.S., SC & Beaufort Co., SC; 1970-1999



Data Source: Bureau of Economic Analysis, Regional Accounts Data, Local Area Personal Income, CA1-3 Per Capita Personal Income, Percent of U.S.

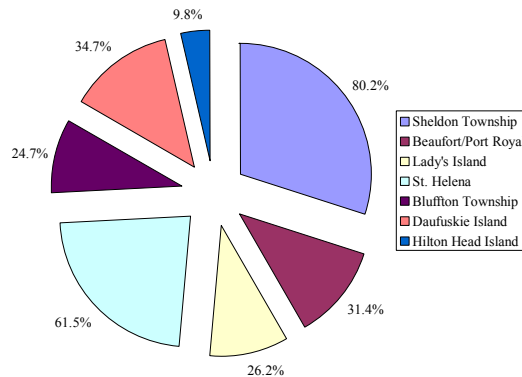
The county per capita income for 1990 was 20,976 dollars, which was greater than both the state (16,050 dollars) and the nation (19,584 dollars). However, the magnitude of that difference diminishes when per capita income is examined at the sub-county level. County planning area per capita incomes in 1990 ranged between 26,412 dollars (Daufuskie Island) and 7,488 dollars (Sheldon Township), a 3.5 to 1 ratio from largest to smallest (*see* Figure 15). This suggests significant place specific income disparities within the county. Notably, the differences among per capita incomes within the planning areas coincide with racial make-up. The two areas with the largest percentage of blacks among their population are also those with the lowest per capita incomes, Sheldon Township with 80.2 percent black and \$7,488 PCI and St. Helena Island with 61.5 percent black and \$9,137 PCI (*compare* Figures 15 and 16).

Figure 15. Per Capita Income by County Planning Area; Beaufort Co., SC; 1990



Data Source: Beaufort County Planning Department, Beaufort County Comprehensive Plan, 1997 Update, Table 4. Median Household Income & Per Capita Income by Specific Area, 1990.

Figure 16. Percent Black Population by County Planning Area; Beaufort Co., SC; 1990



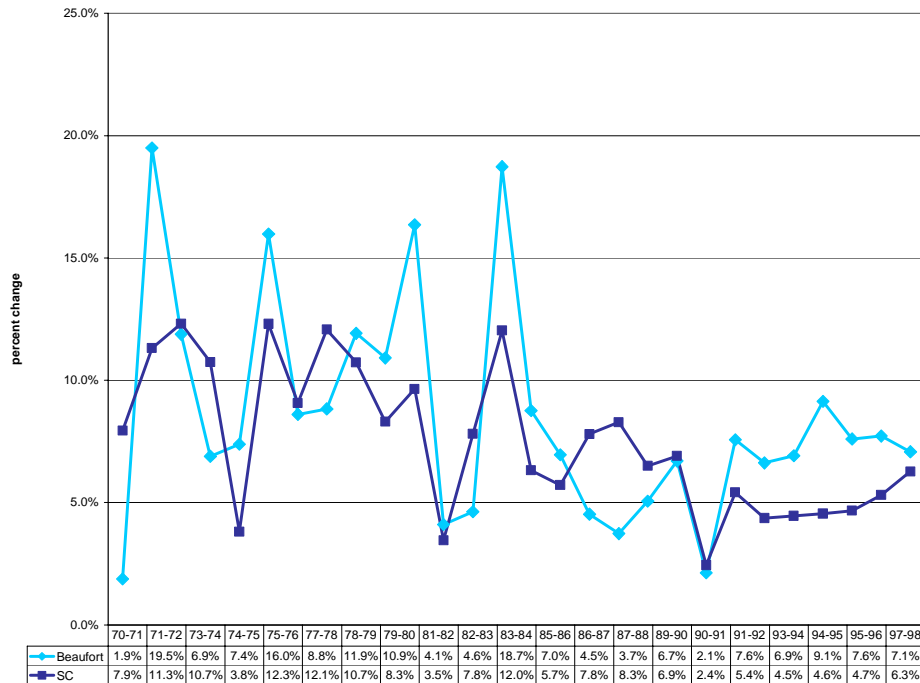
Data Source: Beaufort County Planning Department, Beaufort County Comprehensive Plan, 1997 Update, Table 2. 1990 Racial Profiles for Beaufort County.

Earnings

Total net earnings by place of work focuses on the economic well being of the region's working population, as opposed to per capita income which is a measure of the entire population. The following figures represent current, inflation adjusted, average, and breakdown of earnings for Beaufort County since 1970 (Figures 17-21).

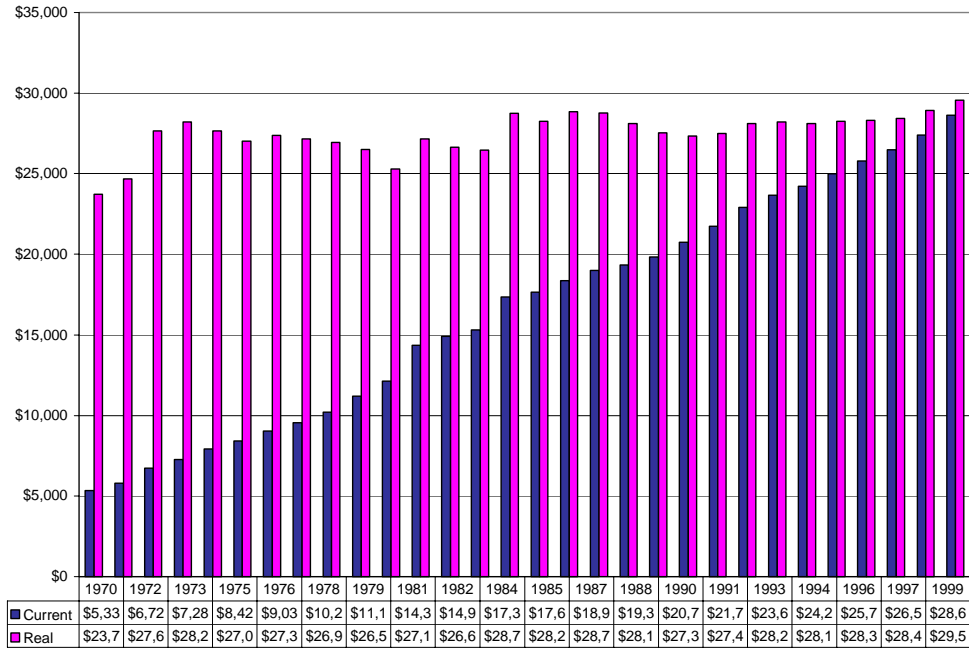
Although net earnings for Beaufort County have been more variable from year to year than those of the state as a whole, average percentage change for the county from 1970 to 1998 was only slightly above that of South Carolina, at 7.9 to 7.0 percent (*see* Figure 17). Average earnings per job for the county has shown a 19.7 percent real change over the last thirty years compared to 15 percent for the state and in 1999 county and state averages were nearly equal, 28,617 county dollars compared to 28,069 state dollars (*see* Figures 18 and 19).

Figure 17. Percent Change in Total Net Earnings by Place of Work; SC and Beaufort Co., SC; 1970-1998



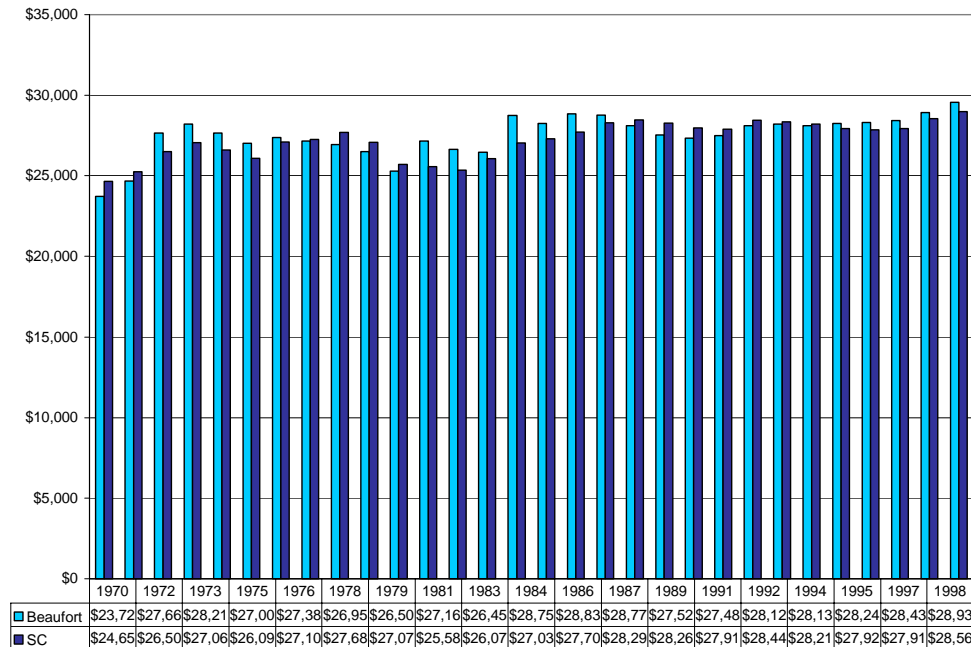
Data Source: Bureau of Economic Analysis, Regional Accounts Data, Local Area Personal Income, CA30 Regional Economic Profiles

Figure 18: Average Earnings Per Job; Current and Real (2000);
Beaufort Co., SC; 1970-1999



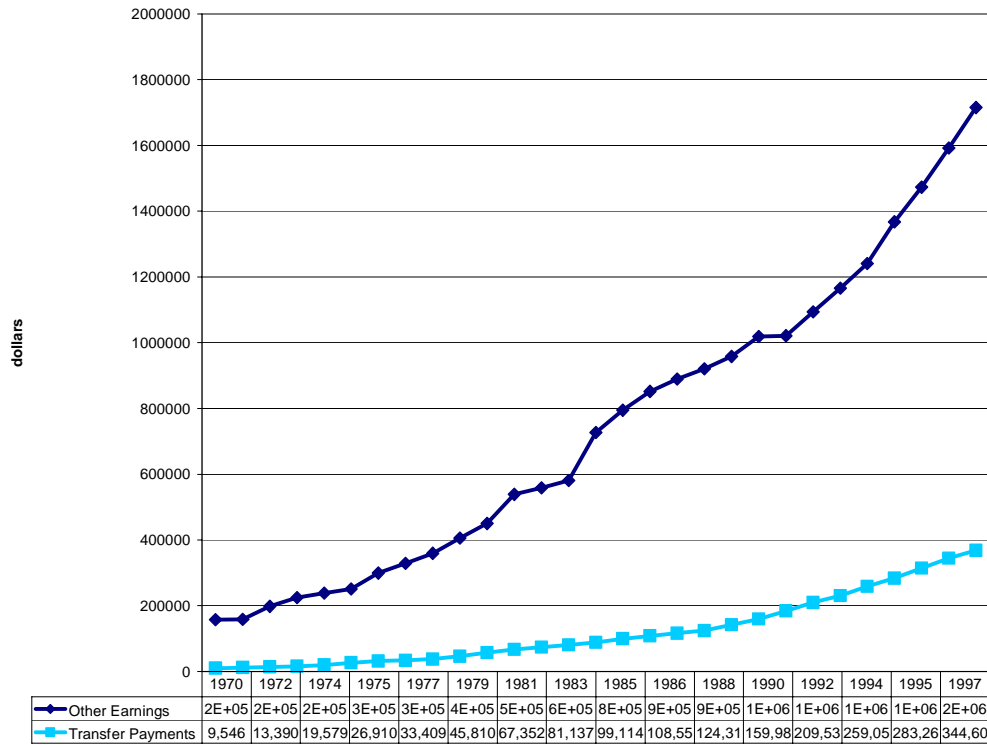
Data Source: Bureau of Economic Analysis, Regional Accounts Data, Local Area Personal Income, CA25 Total Full-Time and Part-Time Employment by Industry, number of jobs and CA05 Personal Income by Major Source and Earnings by Industry, thousands of dollars

Figure 19. Real (2000) Average Earnings Per Job; SC and Beaufort Co., SC; 1970-1999



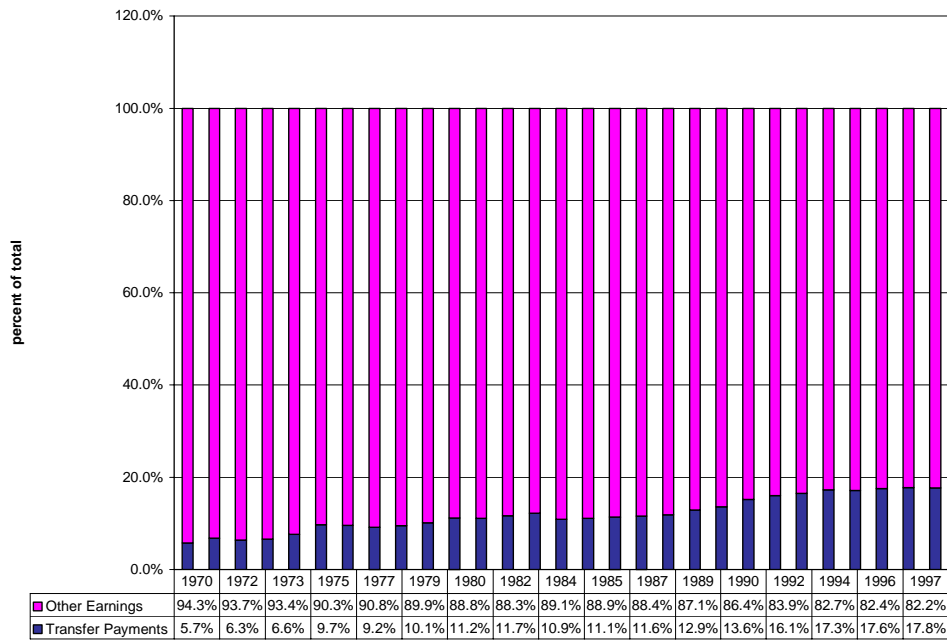
Data Source: Bureau of Economic Analysis, Regional Accounts Data, Local Area Personal Income, CA25 Total Full-Time and Part-Time Employment by Industry, number of jobs and CA05 Personal Income by Major Source and Earnings by Industry, thousands of dollars

Figure 20. Total Transfer Payments and Other Earnings; Beaufort Co., SC; 1970-1998



Data Source: Bureau of Economic Analysis, Regional Accounts Data, Local Area Personal Income, CA30 Regional Economic Profiles

Figure 21. Total Transfer Payments and Other Earnings as a Percentage of Total Net Earnings by Place of Work; Beaufort Co., SC; 1970-1998



Data Source: Bureau of Economic Analysis, Regional Accounts Data, Local Area Personal Income, CA30 Regional Economic Profiles

Total net earnings by place of work are comprised of transfer payments and other earnings (dividends, interests, and rents). Each has continued to rise and diverge since 1970 as the growth rate for other earnings has exceeded that for transfer payments (*see* Figure 20). However, when taken as a percentage of total net earnings transfers grew by 12 percent between 1970 and 1998 (5.7 percent to 17.7 percent) while other earnings similarly decreased, from 94.3 percent to 82.3 percent (*see* Figure 21). As such, despite the growing importance of transfer payments to county residents, they remain relatively small as a portion of total earnings.

Summary Trend Analysis

Beaufort County has had across the board positive growth rates exceeding those for both the State of South Carolina and the United States over the last thirty years in addition to increasing diversification in industry structure. However, the county is clearly transitioning in a number of ways that may challenge future economic stability, if not for the county as a whole, at least for multiple enclaves.

The combined structural changes in county demographics and industry sectors have set in motion the wheels for increasing economic inequality. For instance, the majority of the county population growth has taken place in two sub-county areas with very different income structures, Hilton Head at the high end and Bluffton at the low-end. Service and retail jobs are replacing military and civil service positions, which tend to have higher wage rates than the former. The impact of this change is likely to be the greatest in the Port Royal area, which was already among the lowest income regions in 1990 and whose community and its surroundings are deeply vested in the military installations.

The continual growth pressures of Hilton Head and the like pose serious challenges to individual communities and the county as a whole to preserve residential integrity and the natural resource base, such as lower income housing and farms, which are threatened by inflated market values. These and other factors of growth suggest the need for a more formal analysis of the county economic base that will better identify its current structure and therefore the specific impacts of future change to regional income, employment, and industry.

Input-Output Analysis of Economic Base

There are many methods used to describe the economic base of a regional economy, including the simple location quotient approach applied previously. Among those methods is input-output modeling, which provides detailed information on individual sectors in relation to their contribution to the local economy. This technique requires the application of rigorous mathematical procedures to an itemized framework of regional accounts, which is information that describes the transactions between a specified region and the rest of the world as well as among the economic activities within that region.¹⁰ It also offers a means for predicting how that economy will respond to change through the production of some type of multiplier ratio that represents the manner in which an initial increase in demand for regional goods and services ultimately impacts levels of income and employment in the region.

Input-output modeling is made easy by the availability of computer software programs and databases specifically designed for such analysis. There are a number of programs that have been developed, but at their core is the IMPLAN (IMPact analysis for PLANning) modeling system that was introduced by the USDA Forest Service (Alward et al, 1989). The initial creation of IMPLAN was aimed at internal use by the Forest Service, but due to the overabundance of analyses requested its developers packaged the software and related databases for dissemination among interested parties.¹¹

The IMPLAN system can be used to construct custom input-output models for any county or multi-county region in the United States.¹² The research presented in the remainder of this work is the result of its application to Beaufort County, South Carolina. The county model was constructed from relevant IMPLAN Pro 1998 data sets and parameters obtained from the Minnesota IMPLAN Group. The model and its interpretation reported here should be perceived of as descriptive in nature and should not be used for any detailed analysis without further consultation with the primary investigators. An overview of the input-output framework is first given in order to assist in the understanding of the technique's offerings and shortcomings.

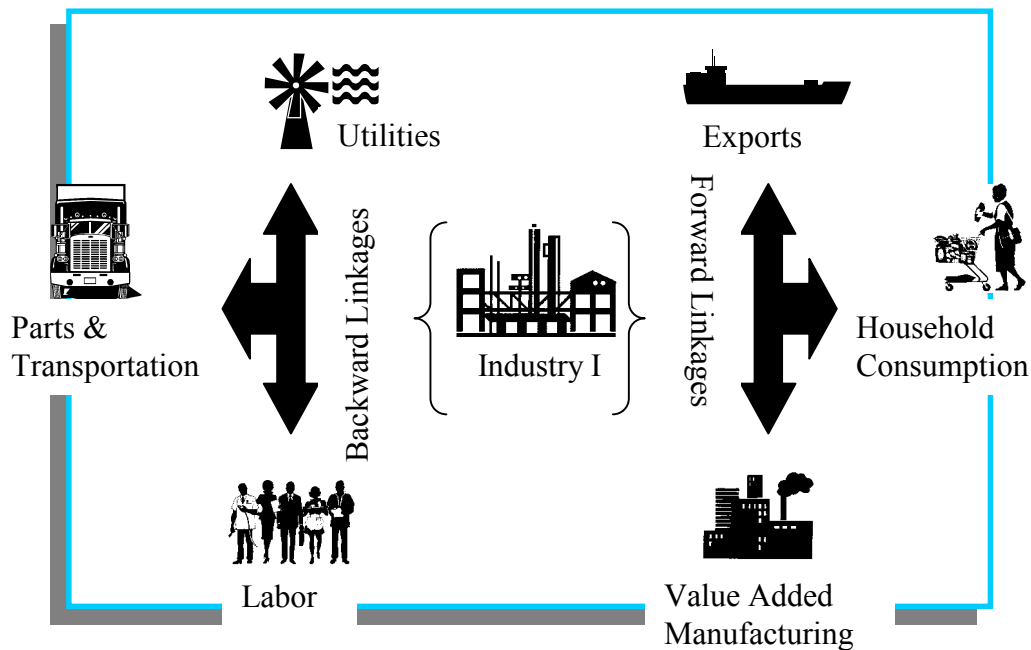
¹⁰ For a full explanation of methods a useful source is Miller and Blair, 1985.

¹¹ IMPLAN was made available to the public through a joint effort by the Center for Community Economic Development and the University of Wisconsin Extension and is currently available for purchase through the Minnesota IMPLAN Group, Inc.

Overview of Input-Output

The focus of input-output analysis is the interdependency of each industry's sales and purchases with the contraction and expansion of the region's overall economy. In tracing those changes the flow of money can be followed backward as payments from purchaser to seller or forward in the form of goods and services from the producer to consumer. The framework of the economy is thereby symmetrical with respect to supply and demand, or in other words, inputs and outputs. As such, neither supply nor demand is assumed to be the sole determinant of growth.

Figure 22. Forward and Backward Linkages Supporting Industry



A simplistic example of the linkages between an industry and its suppliers and consumers are depicted in Figure 22.¹³ Industry I purchases the inputs needed to produce its products, such as labor, parts and transportation, utilities, and so forth. Those transactions or accounts with suppliers of goods and services are referred to as backward linkages. Forward linkages exist between an industry producing a good or service and its consumers. Those consumers may be

¹² Databases are also available by zip-code designation, therefore regions may also be specified on that basis.

households¹⁴, the outside world¹⁵ (exports), or other local industries (intermediate demand¹⁶) or institutions (e.g. government¹⁷) that may use the product of industry I for consumption (final demand¹⁸) or as inputs to which they will add further value in the production of their own product.¹⁹

Input-output analysis works in the reverse, stressing the effects of change from final demand backward to intermediate and primary supply sectors.²⁰ Therefore the method is market rather than input oriented and pays no attention to resource constraints or forward or complementary linkage effects.²¹ As such, input-output is said to be a demand-driven model of a regional economy that implicitly assumes that input supplies needed to meet demand are immediately forthcoming with no additive cost. For example, if export demand for a region's manufacturing products increased so that the sector's demand for labor exceeded the local labor force then it is inferred that workers from outside the region would move inside, thus filling the additional need. Conversely, a supply-driven model is dependent on the availability of input resources and assumes unlimited demand of regional products. Accordingly, supply-driven models work forward from primary supply to final demand and changes in the draw upon primary supplies, rather than final demand, give rise to income and employment growth.

¹³ Derived from conceptual model presented in *IMPLAN Pro Version 2 (2000) User's Guide, Analysis Guide, and Data Guide*.

¹⁴ Households are considered both consumers of goods and services as well as sellers (e.g. labor) and are defined as individuals or families either employed or residing in the region.

¹⁵ The outside world refers to individuals and activities other than government outside of the region.

¹⁶ Intermediate or inter-industry demand refers to transactions among private industries within the region.

¹⁷ Government can be Federal, state, or local public authorities within or outside the region.

¹⁸ Final demands are sales of output considered to be in its final form, ready for the final stage of use rather than additional processing. In other words, they are goods and services leaving the region's stream of processing activity by way of exports, household or public sector consumption, or through incorporation into capital stock.

¹⁹ Value added is the portion of total value of output exclusively contributed by the intermediate industry.

²⁰ Inputs are known as factors of primary supply where they are inputs entering the region's processing system for the first time (e.g. labor and capital imports).

²¹ The technical limitations of input-output are based on the following assumptions: 1. The output of each sector is produced with a unique set of inputs, as such, there is no substitution of inputs. 2. The amount of input purchased is determined solely by level of output. Therefore, price effects, changes in technology, and economies of scale are not accounted for. 3. There are no external economies of scale (no agglomeration economies or new industries are included in an additive manner). 4. The in-state and out-of-state distribution of purchases and sales is fixed. 5. There are no constraints on resources, supply is infinite and perfectly elastic. 6. Local resources are efficiently employed, meaning there is no under employment of resources. All new employment stems from employees moving into the region and anyone who loses their job will leave the region.

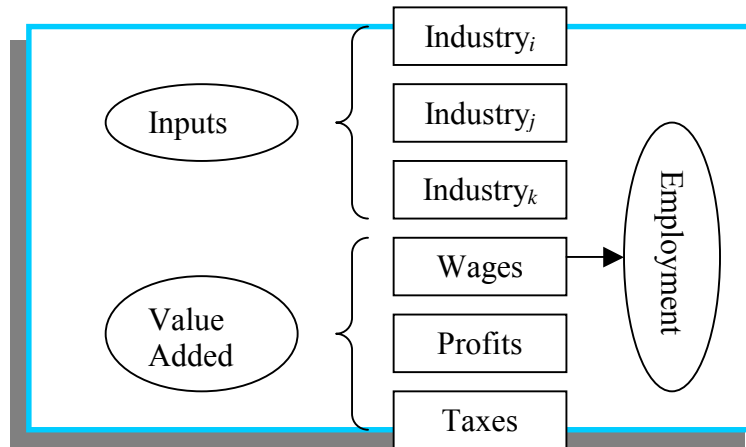
The two models of economic growth are complementary, and if taken together, would provide greater insight into the real processes of change. However, the impacts of changes to input supplies are not as easily detected as that which is due to changes in input demand. For instance, besides some special occasions where technological difference is prevalent within a sector, goods normally pass through successive stages of processing that can be defined in a general production function. Therefore, the necessary increase in inputs due to change in output demand can reasonably be determined. Increases to supply, on the other hand, are not readily traceable. It cannot legitimately be stated that the increased availability of a particular supply will be used for the process and handling of any one product, unless, once again, the form of that input is highly specialized. Given that difficulty, there is presently no model that adequately incorporates the two approaches. As such, input-output remains one-sided and the user must be aware of the implications of that bias.²²

There are three descriptive measures of economic contributions associated with input-output models: output, value added, and employment. Employment represents the number of jobs or people employed in an industry and output is the total dollar value of industry production. Value added is comprised of wages, profits, and taxes that result from economic activity and it is the most readily accepted measure of economy-wide effects because it avoids the measurement error that takes place when the value of industry output is used. The error stems from multiple counting that occurs when output is summed across industries, in other words, output of an industry may be part of the value of output from another or several industries due to inter-industry linkages. Since value added is unique to each industry, it can be summed across the economy without suffering the same. Employment is a value added concept and is also exclusive to individual industries, yet it lacks as a measurement of effects by itself because it does not account for differences in productivity among industries. Figure 23 shows the relationship among these individual measures.²³

²² To guard against misleading conclusions the analysis results must be checked against the known conditions of the study region. For instance, knowledge of excess capacity or resource shortages should be considered during the process of interpretation and wherever possible the analytical technique should be modified to reflect those conditions.

²³ Derived from conceptual model presented in Deputy and Hopkins, February 1999.

Figure 23. Total Value of Output of Industry I



As previously expressed, input-output models are driven by final demand for goods and services. In order to meet those demands industries respond by way of direct or indirect supply in the sense that each producing industry generates its own demand that other industries must fulfill. This is an iterative process that is captured by input-output through what are known as multipliers.

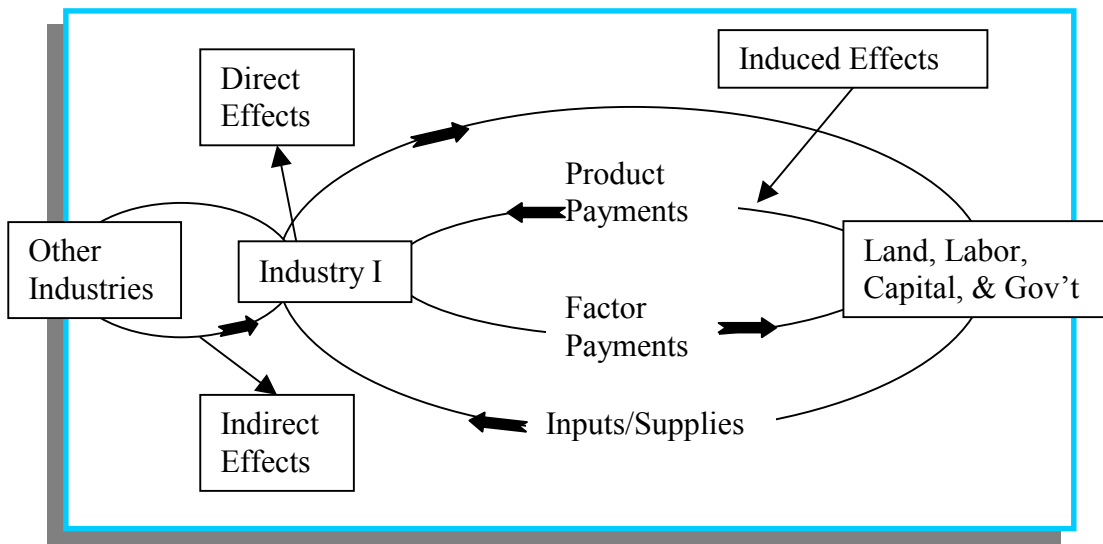
Multipliers break the round by round impacts of economic stimuli into three components: direct effects, indirect effects, and induced effects. Direct effects represent the impacts of the initial change to final demand, therefore it is the change under consideration, such as an increase in product output to the manufacturing sector where demand for manufactured goods has gone up. Indirect effects are the inter-industry changes that would result from purchases made by the manufacturing sector as it responds to that new demand. This may not only result in increased activity for other sectors, but may also invoke additional changes to manufacturing as well. Induced effects represent the impacts to all local industries that result from the growth in expenditures of households.²⁴ Those expenditures stem from the generation of new income by way of the direct and indirect effects. For instance, that initial change in manufacturing output may yield new jobs thus producing additional income, of which a portion is spent within the

²⁴ The input-output model treats households as a separate industry and changes in spending from within that industry reflect increases or decreases in income and/or population that result from changes in final demand. Induced effects from other factors, such as government and investment, may also be counted, but the most prevalent measure is household alone.

regional economy, creating additional demands for goods and services in multiple industries, and so on and so forth.²⁵

The process described is sometimes referred to as the circular flow of income, which is presented in Figure 24.²⁶ Beginning with industry I, an economic stimuli (i.e. change in final demand) will result in factor payments made from industry I to land, labor, capital, and government in return for inputs and supplies, thereby creating induced effects. Those induced effects will return to industry I as well as other industries as product payments, which is income used to purchase more goods and services. The initial stimuli will also cause other industries to respond due to demands placed on them by industry I as it meets its needs. This will in turn create indirect effects that also move back through the system as factor payments in exchange for the inputs and supplies needed to meet their new demand.

Figure 24. Circular Flow of Income



This seemingly endless flow of money continues until all income generated leaks out of the region, meaning that with each iteration some of that income may go to purchase imports²⁷ or into other financial realms, such as household savings. In that respect, it should be recognized that the size and location of the study area, and even the make-up of its population, might

²⁵ Regional purchase coefficients, an econometrically derived measure of trade flows, are used to adjust for those portions of industry purchases made outside the region.

²⁶ Derived from conceptual model presented in Deputy and Hopkins, February 1999.

²⁷ Purchases made from outside the region under consideration, whether they be domestic or foreign.

significantly alter the amount of leakage, and therefore, the magnitude of the multiplier. For instance, the greater the size of the defined region, the greater the opportunity may be to conduct economic activity within that region (e.g. a larger selection of businesses from which to make purchases). In reference to geography, locations near major economic centers external to the region may draw from the local income pool more so than would be the case for remote study areas. The last example, population, presents multiple factors related to consumption and savings patterns, such as differences based on income levels or life-cycle stages. Therefore, for multipliers to prove useful for estimating impacts to changes in the local economy or identifying the structural interdependence between sectors, they must be accompanied by additional insight with respect to the region's situation.

IMPLAN offers three basic sets of multipliers: output, employment, and total value added. The difference between these multipliers is relative to the relationships shown in Figure 23. Output multipliers represent the sum of direct and indirect requirements from all sectors needed to deliver a one-dollar unit of output to final demand. Employment multipliers measure the total change in employment due to a one-unit change in labor force employed for a given sector. Value added multipliers represent income or any value added component derived from the relationship between income and output. They include labor income (personal income = employee compensation + proprietor's income), other property type income, and indirect business taxes. The total value added multiplier represents the additive change in those components based on the individual dollar shift in final demand.

There are also three common types of multipliers and they vary based on the effects that are counted. Type I multipliers measure the direct and indirect effects of change in economic activity. They are limited to capturing inter-industry effects, that is, the result of local industries buying from other local industries. Type II multipliers capture direct and indirect effects that stem from income and expenditures of households in addition to the inter-industry effects. This results in a higher estimate of economic activity (i.e. larger multiplier values) than for Type I.

Finally, type SAM multipliers capture the same effects as type II, but in a more well-defined manner by using complete social accounting information to generate a model that includes non-industrial financial flows (e.g. taxes).²⁸ This allows for the incorporation of such

²⁸ The social accounting matrix contains standard input-output information (value added factors, institutional final demand, and import/export trade) as well as: 1. Factor and institution exports- value added and institution payments received from outside the region. 2. Factor imports- distribution of payments outside the region. 3. Factor

things as the effects of additional institutions (e.g. government) into the model as well as the resultant effects of the disaggregation of internal and external income flows, labor by household location, and households by income.²⁹ Generally, type SAM multipliers will be smaller than Type II, in part because household expenditures are based on disposable rather than total income.

Although type SAM multipliers more realistically capture the process of change in a regional economy than type II, and type II more so than type I, they are also more prone to error given the level of detail. However, since government activity is thought to be directly linked to the local economy and the role of income (i.e. poverty) is of particular concern for the region under consideration in this report, social accounts were used in the construction of the input-output model that follows.

Commodity Supply

Commodity supply is a measure of the resources available to a region from which to extract value added. In other words, it represents the product base on which other economic activity is dependent (i.e. by way of production and trade of those commodities). Two different forms of commodity production are considered in this analysis, industry commodity production, which represents the production of commodities by industries and institutional commodity sales or those commodities produced by non-industry sources, such as households. Each are presented as a percentage of total production for all commodities and that which is available for local and domestic consumption (Table 2).³⁰ Industry production is further broken down into production as a percentage of market shares by individual sectors (Table 3).³¹

distribution- payments from value added sectors to institutions. 4. Inter-institutional transfers- payments from one institution to another.

²⁹ Social accounts include data on income distribution, commuting, tax payments, and savings. This allows for labor income to be distributed among households living in the region, households outside the region, and social security taxes. Therefore consumption expenditures of in-region households are based on disposable income only and measures of government and investment can also be derived if so desired.

³⁰ Local commodity demand + domestic commodity demand = net commodity supply = total commodity supply – foreign exports. Foreign exports are commodities exported beyond national borders while domestic exports are commodities exported (outside of the region) but that which remains within national boundaries.

³¹ Market shares are the percentage of the total production of a commodity that is produced by each industry.

Table 2. Commodity Supply; Percent of Total; Beaufort Co., SC; 1998

Commodity	Industry Commodity Production*	Institutional Commodity Sales*	Total Commodity Supply*	Net Commodity Supply*
Ag, Fishing, Forestry	1.2%	0.6%	1.2%	1.1%
Mining	0.0%	0.2%	0.0%	0.0%
Construction	13.1%	0.0%	12.9%	13.3%
Manufacturing	5.3%	1.4%	5.3%	3.9%
TCPU	6.6%	0.7%	6.6%	6.5%
Trade	12.5%	3.9%	12.4%	12.6%
FIRE	21.5%	0.0%	21.3%	21.2%
Services	18.3%	62.6%	18.8%	19.3%
Government	20.9%	0.1%	20.6%	21.3%
Other	0.6%	30.3%	1.0%	0.8%
Total	5,525.98	73.048	5,599.03	5,426.67

Total percentages may not sum to 100 due to rounding

*Millions of Dollars

Industry based production is largely comprised of finance, insurance, and real estate (FIRE), government, and service commodities, which together make up more than 60 percent of that which is produced locally (*see* Table 2). Services also represent the most significant category of institutional commodity sales (62.6 percent), followed by “other” (30.3 percent), which is a miscellaneous grouping. The majority of total commodity supply, approximately 97 percent, remains available for local and domestic export consumption.

Industry sectors are defined by the product that they produce the most, however, total industry output may also include alternative commodity types. For instance, in Beaufort County only 77.9 percent of transportation, communication, and public utilities (TCPU) are produced by TCPU industries, the remaining market share is held by government enterprises (*see* Table 3). In addition, the minuscule amount of mining commodities produced in the county is done so by government and manufacturing industries, and in fact, the mining industry is virtually non-existent. This simple breakdown offers an indication of the weight of individual industry sectors on the health of the Beaufort economy that otherwise, taken at name value, would be misrepresented. A good example of the potential impact of that error is found in the government sector in Beaufort. Government holds approximately 20 percent of market shares for all commodities combined, 10 percent (100 percent) in government commodities and the other 10 percent (95.6 percent) distributed among five different commodity types.

Table 3. Market Share of Commodity Produced; Percent of Total; Beaufort Co., SC; 1998

Commodity / Industry	Ag, Fishing, Forestry	Mining	Const- ruction	Manu- facturing	TCPU	Trade	FIRE	Service	Govern- ment	Other
Ag, Fishing, Forestry	99.3%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mining	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Construction	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Manufacturing	0.0%	28.8%	0.0%	99.5%	0.0%	0.0%	0.0%	0.6%	0.0%	0.3%
TCPU	0.0%	0.0%	0.0%	0.0%	77.9%	0.0%	0.0%	1.0%	0.0%	0.1%
Trade	0.0%	0.0%	0.0%	0.0%	0.0%	98.5%	0.0%	0.0%	0.0%	0.4%
FIRE	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	98.8%	2.3%	0.0%	0.0%
Services	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	91.5%	0.0%	0.0%
Government	0.5%	71.2%	0.0%	0.1%	22.1%	1.5%	1.2%	4.5%	100.0%	0.2%
Other	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	57.8%
Households	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	16.7%
Capital	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	25.5%
Inventory	0.2%	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	101.0%

Total percentages may not sum to 100 due to rounding

*Millions of dollars

Commodity Demand

Demand can also be broken into two categories, intermediate commodity demand or locally generated demand by industries for local and/or imported commodities and institutional commodity demand, which is local demand by non-industry sources for the same commodities. Institutional demand is comprised of household, government, and other institution final commodity demands, such as capital. Each represents end users that buy goods and services for consumption (includes imports and exports). These goods and services leave the regional economy, and therefore, are not used to generate more products locally. Both total intermediate and institutional demands, as well as relevant breakdowns are given in the following tables (Tables 4-8).

The leading intermediate commodity demands in Beaufort County include manufacturing, services, and FIRE (*see* Table 4). Services (17.3 percent) and FIRE (15.3 percent) are also among the leaders for institutional demand, but Government is number one with 25.7 percent. Intermediate commodity demand is broken into industry sectors in Table 5. This table gives an indication as to the backward linkages that exist for local industries. For instance, 74.3 percent of total demand for the service industry is for agricultural commodities, which in Beaufort are produced almost entirely by the agricultural industry. However, the extent to which

local agricultural industry production is used to meet that demand will be discussed in a later section.

Table 4. Commodity Demand; Percent of Total; Beaufort Co., SC; 1998

Commodity / Industry	Intermediate Commodity Demand*	Institutional Commodity Demand*	Total Gross Commodity Demand*
Ag, Fishing, Forestry	2.0%	0.4%	0.8%
Mining	1.6%	0.0%	0.4%
Construction	4.7%	10.6%	8.9%
Manufacturing	28.0%	12.1%	16.5%
TCPU	10.0%	4.7%	6.2%
Trade	8.1%	12.2%	11.1%
FIRE	16.6%	15.3%	15.6%
Services	27.1%	17.3%	20.0%
Government	1.4%	25.7%	19.0%
Other	0.6%	1.7%	1.4%
Total*	1,707.71	4,525.48	6,233.19

Total percentages may not sum to 100 due to rounding
*Millions of dollars

Table 5. Intermediate Commodity Demand; Percent of Total; Beaufort Co., SC; 1998

Industry/ Commodity	Ag, Fishing, Forestry*	Mining*	Con-struction*	Manu-facturing*	TCPU*	Trade*	FIRE*	Services*	Govern-ment*
Ag, Fishing, Forestry	34.3%	0.0%	1.1%	0.3%	0.0%	1.3%	2.4%	74.3%	0.4%
Mining	0.2%	0.0%	1.2%	4.1%	10.0%	0.0%	0.0%	0.0%	4.9%
Construction	2.3%	0.0%	0.2%	1.2%	5.3%	1.6%	12.5%	0.6%	28.8%
Manufacturing	28.0%	0.0%	52.7%	57.3%	10.3%	21.1%	2.3%	4.7%	17.5%
TCPU	7.5%	0.0%	6.1%	8.3%	34.8%	11.5%	6.5%	2.3%	19.4%
Trade	11.0%	0.0%	15.3%	12.0%	4.5%	8.9%	1.2%	1.3%	2.6%
FIRE	11.2%	0.0%	3.4%	3.2%	6.4%	13.6%	50.2%	4.1%	7.7%
Services	5.2%	0.0%	19.9%	12.2%	25.1%	39.3%	22.5%	12.0%	14.2%
Government	0.1%	0.0%	0.3%	0.4%	0.6%	1.8%	2.2%	0.6%	2.2%
Other	0.0%	0.0%	0.0%	1.0%	3.1%	0.9%	0.2%	0.1%	2.2%
Total Demand*	22.79	0	460.74	165.89519	118.47	191.01	329.5	1.399505	62.46

Total percentages may not sum to 100 due to rounding
*Millions of dollars

Total institution commodity demands include household and government demand as well as capital formation, inventory purchases, and foreign exports. Capital formations are private expenditures for durable goods or capital equipment. It should be noted that these values do not represent expenditures by an industry sector, but rather the increase in an area's overall durable goods assets. In Beaufort County construction makes up the largest proportion of that capital

formation, both for total and local demand (*see* Table 6). Inventory purchases are simply the value of commodity produced in a region that is not consumed or used within one year. For the defined industries (considering all but ‘other’), trade demands the largest inventory.

Table 6. Institutional Commodity Demand; Percent of Total; Beaufort Co., SC; 1998

Institution/ Commodity	Sum of Households	Sum of Federal	Sum of State & Local*	Capital*	Inventory*
Ag, Fishing, Forestry	0.6%	0.0%	0.3%	0.0%	0.0%
Mining	0.0%	0.0%	0.0%	0.0%	0.0%
Construction	0.0%	0.5%	12.2%	78.2%	0.0%
Manufacturing	18.8%	1.2%	5.3%	3.4%	8.5%
TCPU	7.3%	0.3%	3.4%	1.1%	4.3%
Trade	19.6%	0.2%	1.1%	4.4%	9.3%
FIRE	23.4%	0.4%	2.1%	10.5%	0.0%
Services	27.7%	2.0%	4.3%	2.4%	0.0%
Government	0.7%	95.1%	71.3%	0.0%	0.0%
Other	2.0%	0.2%	0.1%	0.0%	77.9%
Total Demand*	2661.73	988.38	287.51	560.20	27.66

Total percentages may not sum to 100 due to rounding

*Millions of dollars

Household commodity demand consists of payments by individuals and households to industries for goods and services used for personal consumption. Household demand makes up the largest component of final demand, as shown in Table 6. Yet, spending patterns can differ dramatically when disaggregated by income level and commodity types. For instance, total demand is six times greater for income levels of 70 thousand dollars or more than for those with 5 thousand or less (*see* Table 7).

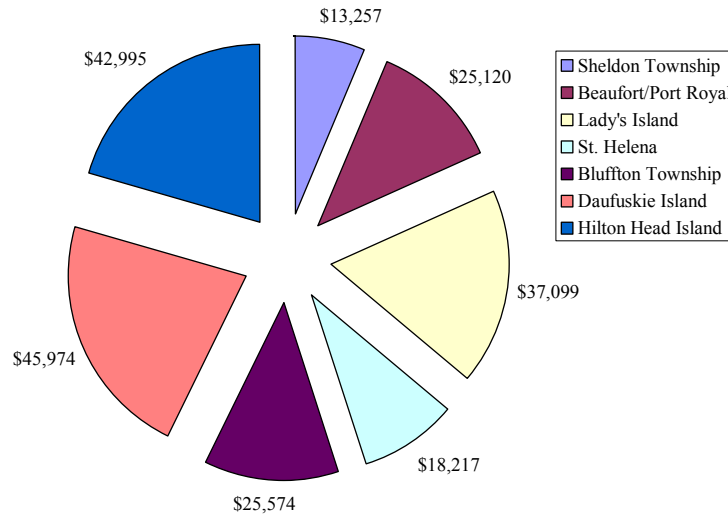
Breaking points in spending patterns also become apparent, such as the grouping of total demand patterns between 20 thousand and 50 thousand range limits and so forth. Comparing these numbers to median household income at the sub-county level, total demand for Bluffton Township households would more than likely resemble that for Lady’s Island (*compare* Table 7 and Figure 25). In addition, Table 7 suggests that spending on services is greatest for most Beaufort County households regardless of income range. However, a disaggregation of commodity demands indicates that although Sheldon Township and St. Helena households are likely to make equal demands for owner occupied housing, they are less likely to demand similar amounts of doctor and dentist services (*compare* Figure 25 and Table 8).

Table 7. Household Commodity Demand; Percent of Total; Beaufort Co., SC; 1998

Household Income/Commodity	<\$5k	\$5-10k	\$10-15k	\$15-20k	\$20-30k	\$30-40k	\$40-50k	\$50-70k	\$70k+
Ag, Fishing,									
Forestry	0.7%	0.7%	0.8%	0.8%	0.7%	0.6%	0.7%	0.6%	0.5%
Mining	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Construction	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Manufacturing	16.1%	17.7%	20.9%	20.4%	19.4%	18.1%	19.8%	19.0%	17.7%
TCPU	8.5%	8.5%	9.2%	8.3%	7.7%	7.1%	6.9%	6.7%	6.8%
Trade	16.1%	15.9%	19.3%	18.8%	20.4%	19.0%	20.6%	20.6%	19.2%
FIRE	21.2%	20.8%	23.3%	21.9%	22.1%	23.1%	24.5%	23.6%	24.8%
Services	35.3%	34.0%	24.1%	27.5%	27.1%	29.6%	24.8%	26.4%	28.1%
Government	0.6%	0.6%	0.7%	0.8%	0.8%	0.6%	0.7%	0.6%	0.8%
Other	1.6%	1.7%	1.7%	1.6%	1.9%	1.8%	2.0%	2.5%	2.1%
Total Demand*	92.86	89.07	128.39	160.08	389.74	397.48	306.96	538.33	558.82

Total percentages may not sum to 100 due to rounding
 *Millions of dollars

Figure 25. Median Household Income by County Planning Area; Beaufort Co., SC; 1990



Data Source: Beaufort County Planning Department, Beaufort County Comprehensive Plan, 1997 Update, Table 4. Median Household Income & Per Capita Income by Specific Area, 1990.

Table 8. Top Household Commodity Demands; Percent Total All Commodity Demands by Income Group; Beaufort Co., SC; 1998

Household Income/ Commodity	<\$5k	\$5-10k	\$10-15k	\$15-20k	\$20-30k	\$30-40k	\$40-50k	\$50-70k	\$70+
Owner-occupied									
Dwellings	10.4%	8.4%	11.9%	11.9%	11.9%	14.3%	16.3%	18.4%	21.8%
Hospitals	7.6%	5.3%	6.9%	7.8%	8.4%	8.3%	9.3%	9.0%	9.3%
Doctors and Dentists	8.9%	9.1%	3.9%	8.3%	6.8%	8.7%	4.6%	4.6%	4.2%
Real Estate	12.3%	13.5%	12.0%	9.7%	8.3%	6.8%	5.2%	3.0%	1.7%
Eating & Drinking	4.2%	4.5%	5.2%	5.1%	5.1%	4.5%	5.5%	5.6%	5.0%
Banking	3.6%	4.1%	5.2%	4.6%	5.4%	4.8%	5.2%	5.2%	4.4%
Wholesale Trade	2.6%	3.2%	4.4%	4.1%	5.1%	4.7%	5.0%	4.8%	3.9%
Insurance Carriers	4.5%	5.0%	5.3%	5.2%	4.4%	3.9%	4.2%	3.6%	3.1%
Miscellaneous Retail	3.2%	3.7%	4.1%	3.8%	3.8%	3.5%	3.8%	3.8%	3.3%

Government commodity demand is broken into Federal expenditures on military purchases, non-military purchases, and investment and state and local expenditures on non-education, education, and investment. Non-military expenditures supply all other Federal government functions (e.g. natural resource management of public lands) and non-education expenditures are for all other state and local government activities, such as police protection. As would be expected given the significance of military installations in the area, Federal investment demands are largely manufacturing followed by construction (*see* Table 9). Likewise, the majority of Federal defense/non-defense are allocated to government commodities.

Table 9. Government Commodity Demand; Percent of Total; Beaufort Co., SC; 1998

Institution/ Commodity	Federal Non- defense*	Federal Defense*	Federal Investment*	State & Local Non-education*	State & Local Education*	State & Local Investment*
Ag, Fishing,						
Forestry	0.0%	0.0%	0.0%	0.4%	0.1%	0.0%
Mining	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Construction	2.8%	0.0%	19.0%	4.4%	1.3%	97.4%
Manufacturing	2.2%	0.1%	75.2%	6.4%	4.4%	2.0%
TCPU	2.3%	0.0%	0.3%	3.8%	3.5%	0.0%
Trade	0.9%	0.0%	5.5%	1.5%	0.6%	0.3%
FIRE	4.7%	0.0%	0.0%	3.5%	0.2%	0.0%
Services	19.8%	0.2%	0.0%	6.2%	2.5%	0.0%
Government	65.4%	99.6%	0.0%	73.6%	87.2%	0.0%
Other	1.7%	0.1%	0.0%	0.0%	0.1%	0.2%
Total Demand*	92.523	883.739	12.114	160.433	99.746	27.327

Total percentages may not sum to 100 due to rounding

*Millions of dollars

The last category of commodity demands are exports. Foreign exports are shipments from local industries to destinations outside of the United States, while domestic exports are shipments outside of the local area but within the U.S. Manufacturing commodities make up the greatest percentage share of foreign exports at 47 percent of the total (*see* Table 10). FIRE dominates domestic exports (39.2 percent) and is ranked second for foreign exports (24.4 percent). Overall, FIRE is followed by manufacturing, services, and construction commodities. When disaggregated by that which is applicable only to the forestry industry, wood product commodities are the most in demand by foreign markets, however, Table 11 reveals that among the county's commodity exports the forestry sector contributes little.

Table 10. Commodity Exports; Percent of Total; Beaufort Co., SC; 1998

Export/Commodity	Foreign*	Domestic*	Total*
Ag, Fishing, Forestry	1.7%	2.9%	2.7%
Mining	0.0%	0.0%	0.0%
Construction	0.0%	13.2%	11.6%
Manufacturing	47.0%	15.0%	18.9%
TCPU	9.9%	7.8%	8.1%
Trade	5.5%	6.8%	6.6%
FIRE	24.4%	39.2%	37.4%
Services	5.4%	15.2%	14.0%
Government	0.0%	0.0%	0.0%
Other	6.1%	0.0%	0.7%
Total*	172.36	1252.94	1425.30

Total percentages may not sum to 100 due to rounding
 *Millions of dollars

Table 11. Commodity Exports; Forestry Sector; Percent of Total; Beaufort Co., SC; 1998

Export/Commodity	Foreign*	Domestic*	Total*
All Others	99.2%	99.6%	99.6%
Ag, Forestry, Fishing	0.0%	0.4%	0.4%
Pulp & Paper	0.1%	0.0%	0.0%
Wood Furniture	0.0%	0.0%	0.0%
Wood Products	0.6%	0.0%	0.1%
Total*	72.36	648.84	821.20

Total percentages may not sum to 100 due to rounding
 *Millions of dollars

Consumption Patterns

In order to understand the conjunction between the supply and demand factors noted for Beaufort County and the growth potential as they relate to the local economy, consumption patterns must also be examined. Local supply and demand relationships are translated through

the S/D ratio, average RPCs, and average RSCs (Tables 12 and 13). The domestic S/D ratio is the relationship of net commodity supply to total gross commodity demand. (If supply exceeds demand then the ratio is set to one). The regional purchase coefficient (average RPC) is the estimated fraction of the county's gross regional commodity demand that is satisfied by local commodities. For example, if the RPC for agriculture is equal to .75 then 75 percent of local demand is met by locally produced commodities and therefore, 25 percent of that demand must be met by imports (Tables 14 and 15). On the other hand, the regional sales coefficient (average RSC) is the fraction of net commodity supply used to meet county gross commodity demand. If the RSC for agriculture is .91 then 91 percent of that which is produced locally is consumed locally.

Domestic demand (local plus domestic export) for commodities produced in Beaufort County exceed supply for all commodities except agriculture, construction, and FIRE (*see* Table 12). The percentage of local demand met by locally produced commodities is greatest for construction (100 percent) and government (97 percent). Government also has the greatest percentage of total commodity produced locally consumed locally at nearly 100 percent. However, since it was noted earlier that the government industry is the greatest consumer of government commodities, it is not likely that this economic activity will create as large a multiplier effect as one might initially presume.

Table 12. Comparison of Commodity Supply and Demand; Beaufort Co., SC; 1998

Commodity	Domestic S/D Ratio	Average RPC	Average RSC
Ag, Fishing Forestry	1	0.5052	0.4007
Mining	0.0087	0.0087	1
Construction	1	1	0.7719
Manufacturing	0.2084	0.0251	0.0874
TCPU	0.9085	0.6545	0.687
Trade	0.9932	0.8699	0.864
FIRE	1	0.675	0.5522
Services	0.8402	0.6875	0.811
Government	0.9727	0.9727	0.9999
Other	0.4904	0.4904	0.8034

In general, manufacturing commodities show the greatest potential for growth domestically and locally, with only 20 percent and 2.5 percent of current demand met, respectively. Presently, 48.6 percent of total imports to the area are manufacturing commodities

mainly for intermediate use (*see* Table 13). Therefore manufacturing commodity purchases represent high level leakages for the county. Overall, manufacturing imports exceed exports by 29.7 percent (*compare* Tables 10 and 13) and total county exports make up only 69 percent of imports or a 41 to 59 percent export to import balance of trade (*see* Figure 26).

Table 13. Commodity Imports; Beaufort Co., SC; 1998

Import/ Commodity	Intermediate*	Institutional*	Total*
Ag, Fishing, Forestry	2.0%	0.7%	1.2%
Mining	3.3%	0.0%	1.3%
Construction	0.0%	0.0%	0.0%
Manufacturing	56.2%	43.5%	48.6%
TCPU	7.1%	6.0%	6.5%
Trade	2.2%	5.8%	4.4%
FIRE	11.1%	18.3%	15.4%
Services	17.4%	19.9%	18.9%
Government	0.1%	2.6%	1.6%
Other	0.6%	3.2%	2.2%
Total*	829.78	1229.69	2059.47

Total percentages may not sum to 100 due to rounding

*Millions of dollars

When disaggregated for the forestry sector agricultural, fishing, and forestry services show the least growth potential for domestic markets (*see* Table 14). While pulp and paper and wood products are likely candidates for production expansion as only 49 percent and 6 percent of both domestic and local market demands were met by Beaufort County in 1998, respectively.

Table 14. Comparison of Commodity Supply and Demand; Forestry Sector; Beaufort Co., SC; 1998

Commodity	Domestic S/D Ratio	Average RPC	Average RSC
All Others	0.8779	0.773	0.8534
Ag, Forestry, Fishing	0.9616	0.4151	0.4307
Pulp & Paper	0.4896	0.4896	0.964
Wood Furniture	0.077	0.077	0
Wood Products	0.0579	0.0579	0.9576

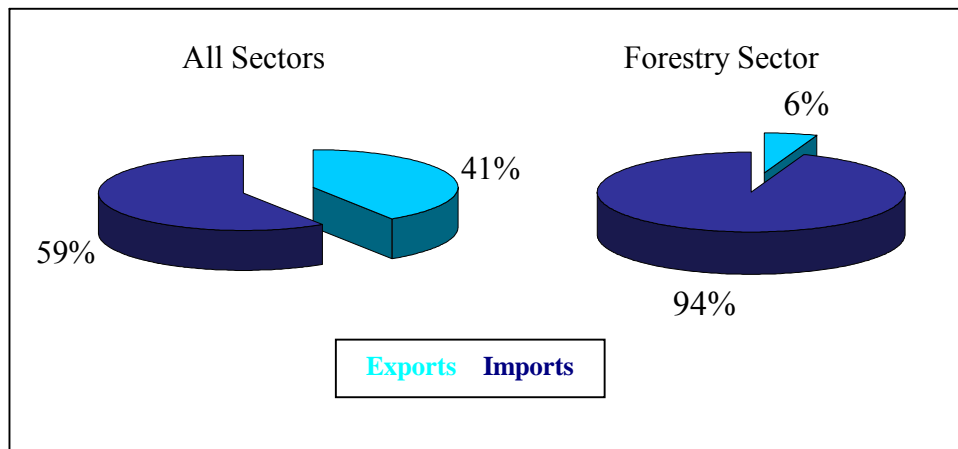
A large percentage of forestry sector commodities are imported compared to all others for the county (*see* Table 15), and when taken as a comparison of imports to exports for that sector alone, the percentage of forestry sector imports is extremely high relative to those for all sectors (*see* Figure 26).

Table 15. Commodity Imports; Forestry Sector; Beaufort Co., SC; 1998

Import/ Commodity	Intermediate*	Institutional*	Total*
All Others	63.1%	62.6%	87.4%
Ag, Forestry, Fishing	2.4%	0.7%	0.7%
Pulp & Paper	23.7%	22.6%	8.0%
Wood Furniture	0.5%	11.8%	1.1%
Wood Products	10.3%	2.3%	2.8%
Total*	117.66	37.70	455.36

Total percentages may not sum to 100 due to rounding
 *Millions of dollars

Figure 26. Trade Balance; Percent of Total Imports & Exports; Beaufort Co., SC; 1998



Economic Contributions

A relative measure of the economic contributions of the aforementioned activities to the region can be ascertained from examining the value of each industry's total production (output), number of jobs (employment), and related income flows (i.e. value added). Values for all aggregated industry sectors are given as well as the total in comparison to the forestry sector (Tables 16 and 17). Other sub-industry breakdowns for agriculture, manufacturing, services, and government are also provided (Tables 18-21).

Total output for the Beaufort County economy was 5,525.98 million dollars in 1998, of which 22.8 percent was produced by government and 21.7 percent by FIRE (*see* Table 16). The largest employers were government, services, and trade. Government, which includes schools,

state and local government, and federal government and military, also generated the largest percentage of employee compensation in the county (39.3 percent).

Table 16. Output, Employment & Value Added; Percent of Total; Beaufort Co., SC; 1998

Industry	Industry Output*	Employment	Employee		Other Property Income*	Indirect Business Tax*	Total Value Added*
			Compensation*	Proprietor Income*			
Ag, Fishing, Forestry	1.2%	2.6%	1.1%	3.7%	0.9%	0.6%	1.1%
Mining	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Construction	13.1%	9.5%	9.9%	20.4%	1.7%	2.0%	6.9%
Manufacturing	5.4%	2.3%	3.8%	0.9%	3.3%	1.1%	3.3%
TCPU	5.4%	2.8%	3.7%	2.8%	6.0%	6.3%	4.7%
Trade	12.4%	21.3%	14.7%	10.5%	6.9%	31.4%	12.9%
FIRE	21.7%	8.6%	4.7%	28.7%	42.9%	48.9%	22.8%
Services	17.5%	25.2%	22.1%	33.0%	6.7%	9.8%	16.2%
Government	22.8%	26.0%	39.3%	0.0%	30.4%	0.0%	31.4%
Other	0.6%	1.8%	0.7%	0.0%	1.3%	0.0%	0.8%
Total*	5525.98	77172.00	1983.16	181.21	1374.63	279.27	3818.27

Total percentages may not sum to 100 due to rounding
*Millions of dollars

Table 17. Output, Employment, & Value Added; Forestry Sector; Percent of Total; Beaufort Co., SC; 1998

Industry	Industry Output*	Employment	Employee		Other Property Income*	Indirect Business Tax*	Total Value Added*
			Compensation*	Proprietor Income*			
All Others	99.7%	99.6%	99.7%	99.7%	99.9%	99.9%	99.8%
Ag, Forestry, Fishing	0.1%	0.2%	0.1%	0.1%	0.0%	0.0%	0.1%
Pulp & Paper	0.2%	0.2%	0.2%	0.2%	0.1%	0.0%	0.1%
Wood Furniture	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Wood Products	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total*	5525.98	77172.00	1983.16	181.21	1374.63	279.27	3818.27

Total percentages may not sum to 100 due to rounding
*Millions of dollars

The forestry sector in comparison to the rest gave the county little, with less than one percent of its output, employment, and value added (*see* Table 17). In relation to other natural resource based industries, agricultural industry output, employment, and value added were dominated by landscape and horticultural services with total percentages 72 percent or greater (*see* Table 18). This may be representative of the large number of golf courses and resorts in the region. Forest products and poultry/eggs fell into the sixth and seventh spots with less than two

percent for all categories, suggesting that there are few significant sub-divisions within the industry. Semiconductors and related devices followed by aircraft and missile equipment were the top two sub-industries for manufacturing, however, there is a major difference between the two, particularly for value added (*see* Table 19). Hotels and lodging places were in the number one spot for the service industry in 1998 in Beaufort County (*see* Table 20). Finally, government sub-industry contributions to the area were true to form with Federal military significantly greater than the rest (*see* Table 21).

Table 18. Agriculture Sub-Industry Output, Employment, & Value Added; Major Sub-Industries; Percent of Total; Beaufort Co., SC; 1998

Industry	Industry		Total Value
	Output*	Employment	Added*
Landscape and Horticultural Services	73.5%	76.5%	72.8%
Commercial Fishing	9.1%	7.7%	12.7%
Agricultural, Forestry, Fishery Services	6.5%	8.2%	6.6%
Vegetables	3.8%	2.0%	3.1%
Greenhouse and Nursery Products	2.1%	1.6%	1.8%
Forest Products	1.4%	1.2%	1.2%
Poultry and Eggs	1.8%	0.5%	0.6%
Total*	64.79	2,045	42

Partial listing, therefore percentages do not sum to 100
 *Millions of dollars

Table 19. Manufacturing Sub-Industry Output, Employment, & Value Added; Major Sub-Industries; Percent of Total; Beaufort Co., SC; 1998

Industry	Industry		Total Value
	Output*	Employment	Added*
Semiconductors and Related Devices	28.5%	25.1%	40.5%
Aircraft and Missile Equipment,	7.5%	10.6%	6.5%
Cyclic Crudes, Interm. & Indus. Organic Chem.	8.4%	2.8%	5.5%
Miscellaneous Publishing	3.4%	4.3%	4.5%
Steel Wire and Related Products	5.3%	3.2%	4.3%
Periodicals	4.2%	4.4%	4.3%
Metal Coating and Allied Services	2.5%	1.3%	3.7%
Commercial Printing	4.3%	7.8%	3.3%
Construction Machinery and Equipment	5.2%	3.4%	2.8%
Miscellaneous Plastics Products	4.1%	4.6%	2.6%
Total*	300.467	1,741	125.926

Partial listing, therefore percentages do not sum to 100
 *Millions of dollars

Table 20. Services Sub-Industry Output, Employment, & Value Added; Major Sub-Industries; Percent of Total; Beaufort Co., SC; 1998

Industry	Industry		Total Value Added*
	Output*	Employment	
Hotels and Lodging Places	18.1%	15.9%	18.9%
Management and Consulting Services	12.2%	6.3%	12.4%
Amusement and Recreation Services, N.E.C.	8.1%	11.0%	8.5%
Doctors and Dentists	6.6%	3.9%	6.9%
Labor and Civic Organizations	4.5%	10.0%	6.2%
Hospitals	5.3%	3.3%	5.8%
Legal Services	4.1%	2.9%	5.0%
Services To Buildings	3.7%	5.4%	3.7%
Engineering, Architectural Services	5.7%	3.7%	3.6%
Total*	965.734	19,427	617.502

Partial listing, therefore percentages do not sum to 100
 *Millions of dollars

Table 21. Government Sub-Industry Output, Employment, & Value Added; Major Sub-Industries; Percent of Total; Beaufort Co., SC; 1998

Industry	Industry		Total Value Added*
	Output*	Employment	
Federal Military	67.6%	57.4%	71.2%
State & Local Non-Education	9.3%	12.2%	9.8%
Federal Non-Military	7.0%	11.0%	7.4%
State & Local Education	6.9%	14.9%	7.3%
Total*	1,259.56	20,041	1,197.11

Partial listing, therefore percentages do not sum to 100
 *Millions of dollars

The industry to industry impact of economic activity can be determined by examining production relationships in the region. The benefit of doing so is that it allows for the estimation of changes to total economic contribution based on change in demand. One way to accomplish this is to state the patterns of expenditures made by a sector as proportions of all inputs needed to produce one dollar of output in a given sector, thus identifying linear production relationships.³² This information is commonly presented in what is known as a direct requirements table (Tables 22 and 23).³³

The direct requirements table can only be read down, as each column essentially represents a “production recipe” for one dollar of output for the purchasing sector at the column

³² This is done by dividing the dollar value of inputs purchases from each sector by total expenditures.

³³ This is also referred to as the matrix of technical coefficients excluding households and imports, which if included would set the total row to one for each industry.

head.³⁴ Each number in the column is the dollar amount of inputs required from the processing sector on the left in order to produce that unit of output. For example, in Beaufort County, for every dollar of sales by the manufacturing sector 32 cents worth of additional output from itself, 7 cents of output each for trade and services, and an additional 12 cents from remaining industries is required (*see* Table 22).

Given this example, an additional dollar of output by the manufacturing sector leads to the purchase of a total of 58 cents from other firms located in the region.³⁵ If those production requirements are not met by industries within the region then they are either obtained from institutions (i.e. households) or are imported. Therefore, in Beaufort’s manufacturing sector 42 cents worth of inputs are derived from institutions or imports. This gives a sense for the level of industry and inter-industry self-sufficiency of the region and its ability to generate wealth. The greater the factor payments for intermediate inputs and supplies made externally, the greater the dependency of the local economy on the outside world (i.e. sensitivity to exogenous factors of change) and the greater the opportunity for leakage. This is discussed in more detail in the remainder of this section.

Table 22. Direct Requirements Table; All Sectors; Beaufort Co., SC; 1998

Purchasing / Processing Sectors	Ag, Fishing, Forestry	Mining	Const- ruction	Manu- facturing	TCPU	Trade	FIRE	Service	Government
Ag, Fishing, Forestry	0.12	0.00	0.01	0.03	0.00	0.00	0.01	0.00	0.00
Mining	0.00	0.00	0.01	0.02	0.04	0.00	0.00	0.00	0.00
Construction	0.01	0.00	0.00	0.01	0.02	0.00	0.03	0.01	0.01
Manufacturing	0.10	0.00	0.34	0.32	0.04	0.06	0.01	0.07	0.01
TCPU	0.03	0.00	0.04	0.05	0.14	0.03	0.02	0.03	0.01
Trade	0.04	0.00	0.10	0.07	0.02	0.02	0.00	0.02	0.00
FIRE	0.04	0.00	0.02	0.02	0.03	0.04	0.14	0.06	0.00
Services	0.02	0.00	0.13	0.07	0.10	0.11	0.06	0.17	0.01
Government	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00
Other	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00
TOTAL	0.35	0.00	0.64	0.58	0.40	0.28	0.27	0.36	0.05

³⁴ This production formula is assumed to be constant and the same for all sector establishments regardless of input prices or production levels (e.g. no economies of scale).

³⁵ Sums may not be exact due to rounding.

Assuming the direct requirements table represents the spending patterns necessary for additional production in all sectors, the effects of a change in a final demand for output in one can be traced to that of another. For instance, in the direct requirements table for the forestry sector, a one dollar unit change in demand for pulp and paper output results in an additional 20 cents worth of demand in pulp and paper products, 3 cents in wood products, and 36 cents from all other non-forestry sectors (*see* Table 23). Therefore, the direct effects of that one-dollar change on the economy would be 159 cents (the initial change plus the direct effect). However, the effect of that change does not stop at that point, the indirect effects must then be estimated by carrying those changes through the impacted sectors. In other words, the 36 cents worth of new demand on all other sectors, the 3 cents on wood products, and the additional 20 cents to pulp and paper must be accounted for. This is accomplished by multiplying the value of the direct effects by the numbers in the relevant columns, which would result in an additional 25 cents, making a total region-wide impact of 184 cents.

Table 23. Direct Requirements Table; Forestry Sector; Beaufort Co., SC; 1998

Purchasing / Processing Sectors	All Others	Ag, Forest, Fish, Svc	Wood Products	Wood Furniture	Pulp and Paper
All Others	0.30	0.33	0.33	0.48	0.36
Ag, Forest, Fish Svc	0.00	0.01	0.00	0.00	0.00
Wood Products	0.00	0.00	0.25	0.17	0.03
Wood Furniture	0.00	0.00	0.00	0.01	0.00
Pulp and Paper	0.01	0.01	0.00	0.04	0.20
Total	0.31	0.35	0.58	0.69	0.59

The cycle of effects does not stop after just two rounds, however, the process continues until the level of indirect effects becomes insignificant (*refer to* Figure 24 *discussion*). IMPLAN calculates the sum of these effects or total requirements, which are presented in Tables 24 and 25 for all Beaufort County sectors and the forest sector in comparison to all others.³⁶ Each column value indicates the total dollar value of output required from the processing sector by the purchasing sector for a one-dollar increase in its final demand.³⁷ For example, the first element in the manufacturing column (.02) indicates the total dollar increase in agriculture, fishing, and forestry service production that results from a one dollar increase in final demand for construction products. The second element indicates the total increase in mining output (.00) due

³⁶ The total requirements table is also referred to as the Leontief inverse table.

to that same one-dollar increase in final demand for manufacturing products. The one-dollar effect across industries continues to be captured down the row, totaling an industry-wide effect of more than one-quarter times the original change to the manufacturing industry (1.28).

Table 24. Total Requirements Table; All Sectors; Beaufort Co., SC; 1998

Purchasing / Processing Sectors	Ag, Fishing, Forestry	Mining	Const-ruktion	Manu-facturing	TCPU	Trade	FIRE	Services	Government	Other
Ag, Fishing, Forestry	1.06	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Mining	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Construction	0.01	0.00	1.00	0.09	0.02	0.01	0.04	0.01	0.01	0.00
Manufacturing	0.00	0.00	0.01	1.01	0.00	0.00	0.00	0.00	0.00	0.00
TCPU	0.02	0.00	0.03	0.03	1.08	0.02	0.01	0.02	0.01	0.00
Trade	0.04	0.00	0.09	0.06	0.02	1.02	0.01	0.02	0.00	0.00
FIRE	0.03	0.00	0.03	0.02	0.03	0.03	1.11	0.05	0.00	0.00
Services	0.02	0.00	0.10	0.06	0.08	0.08	0.05	1.12	0.01	0.00
Government	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00
Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
Total	1.19	0.00	1.26	1.28	1.24	1.18	1.22	1.23	1.03	1.00

Table 25. Total Requirements Table; Forestry Sector; Beaufort Co., SC; 1998

Purchasing / Processing Sectors	All Others	Ag, Forest, Fish, Svc	Wood Products	Wood Furniture	Pulp and Paper
All Others	1.30	0.33	0.37	0.51	0.37
Ag, Forest, Fish Svc	0.00	1.00	0.00	0.00	0.00
Wood Products	0.00	0.00	1.13	0.09	0.02
Wood Furniture	0.00	0.00	0.00	1.00	0.00
Pulp and Paper	0.00	0.00	0.00	0.00	1.01
Total	1.30	1.33	1.51	1.61	1.40

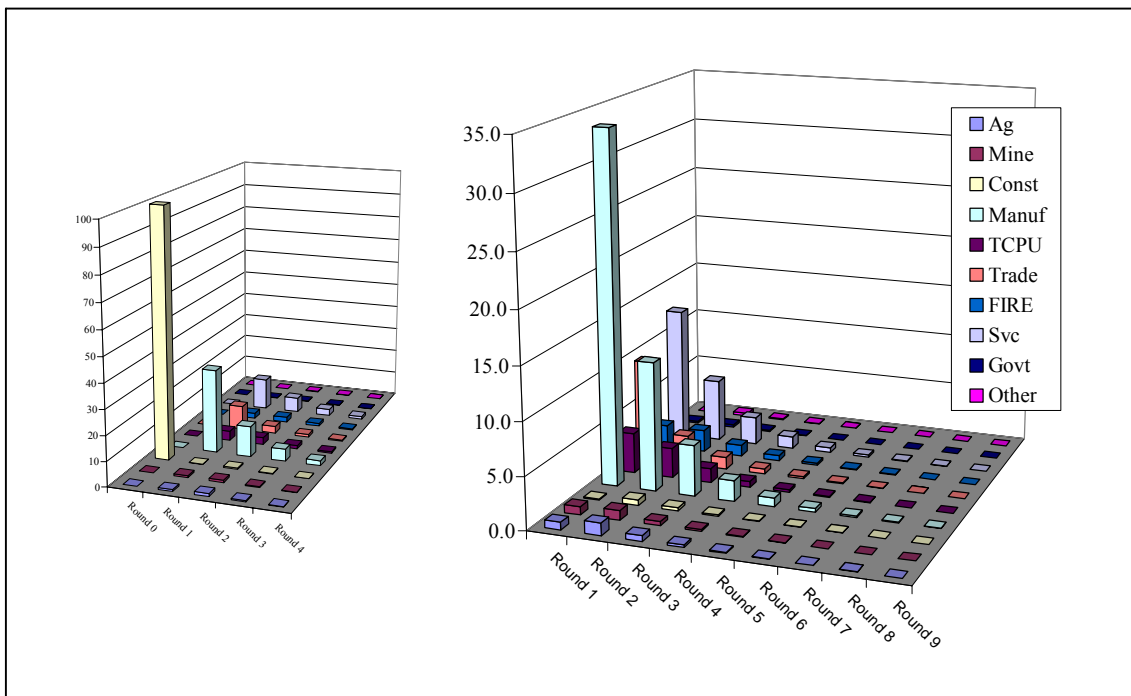
An additional interpretation of the total requirements table is the amount of openness within the economy based on its measure of economic linkages. As mentioned previously, highly linked economies are more self-sufficient in production and are less dependent on outside input sources. A perfectly self-sufficient economy is referred to as a closed economy, whereas open economies are those which must rely on imports and therefore suffer leakages. The degree of linkage or openness of the Beaufort economy can be obtained by reviewing the off-diagonal values in the total requirements table.³⁸ The larger the values the more tightly linked (closed) the economy, likewise, the smaller the values the more open the economy. The table can be difficult

³⁷ Total requirements are representative of inter-industry effects only (i.e. direct plus indirect), therefore induced effects are not included in the measure.

to interpret, however, therefore two illustrative examples for individual sectors are given (Figures 27 and 28).

Figures 27 and 28 show the flow or ripple effect of a one hundred-dollar unit change in final demand for construction and government output, respectively. The smaller graph on the left begins with round 0, the initial change, therefore the small graphs in both figures are to scale and can be directly compared. Round 0 is dropped in the larger graph so that the changes are visually more apparent.

Figure 27. Ripple Effect; One Hundred Construction Units; Beaufort Co., SC; 1998

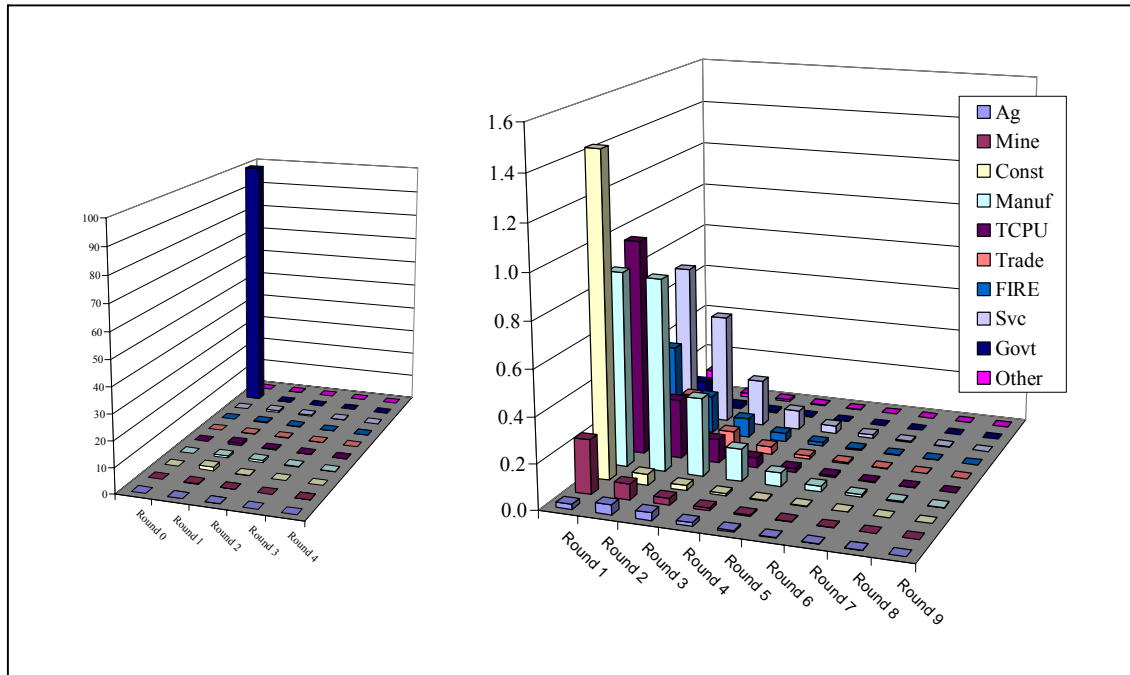


Clearly, the industry-wide direct effect of the change to construction is greater than that for government, as the impact of those 100 units is barely detectable in the smaller figure for government. In addition, the scale of effects in the larger graph is greater for construction than government. However, as the larger graphs reveal, the backward linkages of the government sector are more extensive (reaching more local industries) than the construction sector. Also, the initial 100 dollars circulates through more rounds of economic activity for government than for construction, although a greater percentage of those 100 dollars leaks out of the economy in the first round. As such, from a policy perspective, the preferred sector change would depend on the

³⁸ Off-diagonal values are those that are less than one.

desired outcome (e.g. diversification and more self-sufficient vs. greater dollar returns but less self-sufficient).

Figure 28. Ripple Effect; 100 Government Units; Beaufort Co., SC; 1998



The industry to industry relationships presented numerically in the total requirements table and graphically by the ripple effect figures are equivalent to Type I output multipliers. Output is the basis of the other sets of multipliers as well, income per dollar of output for value added and output per worker ratios for employment. All three sets of final demand multipliers are given for all sectors as well as the forestry sector (Tables 26 and 27). Looking at the Type SAM multipliers in Table 26, construction has the greatest overall effect for total value added, FIRE for employment, and trade for output (closely followed by FIRE and services). For the forestry sector wood furniture has the highest income return, pulp and paper for employment, and agriculture, fishing, and forestry services for output (*see* Table 27).

Multipliers can be used to assess the potential impacts of change to a region based on a “shock” or change in economic stimuli, such as the 50 new jobs in trade used to produce an example impact analysis for Beaufort County, as shown in Table 28. However, the determination as to whether or not a multiplier is accurate or the impact results reasonable requires additional research time, particularly time to answer a number of important questions.

The most essential is of course: How closely does the estimate reflect economic relationships in the region under consideration? The answer may be dependent on the type of data used (e.g. primary or secondary), the level of sector aggregation, the base year from which the model was constructed, the size of the impact in relation to the size of the affected industry, whether or not households or other institutions were included, and a number of other relevant factors. Therefore use of multipliers should be dealt with caution.

Table 26. Final Demand Multipliers; Beaufort Co., SC; 1998

Effect / Industry	Direct	Indirect	Induced	Total*	Type I**	SAM***	
Value Added	Ag, Fishing,						
	Forestry	0.6483	0.1225	0.8028	0.5736	1.1890	2.4275
	Mining	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	Construction	0.3623	0.1706	0.5906	0.1235	1.4709	3.1008
	Manufacturing	0.4191	0.1309	0.5849	0.1349	1.3124	2.7079
	TCPU	0.6011	0.1479	0.8140	0.5630	1.2461	2.6003
	Trade	0.7211	0.1141	0.9228	0.7580	1.1582	2.4380
	FIRE	0.7255	0.1420	0.8788	0.7463	1.1958	2.4071
	Services	0.6394	0.1517	0.8679	0.6590	1.2372	2.5945
	Government	0.9504	0.0186	0.9728	0.9418	1.0196	2.0431
	Other	1.0000	0.0000	0.9549	0.9549	1.0000	1.9549
Employment	Ag, Fishing,						
	Forestry	0.5602	3.7999	0.7792	2.1392	1.1204	1.6521
	Mining	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	Construction	0.1491	4.6904	0.3337	7.1732	1.4622	2.6774
	Manufacturing	0.7952	3.6065	0.2284	1.6301	1.6223	3.7324
	TCPU	0.2017	3.1841	0.9398	7.3256	1.4421	3.7943
	Trade	0.9701	2.7571	0.1430	5.8701	1.1150	1.9136
	FIRE	0.5438	2.4701	0.1189	6.1328	1.4456	4.7138
	Services	0.1160	3.5920	0.1204	1.8284	1.1786	2.0794
	Government	0.9111	0.4311	0.4019	6.7441	1.0271	2.3093
	Other	0.5494	0.0000	0.9702	4.5197	1.0000	1.4483
Output	Ag, Fishing,						
	Forestry	1.0000	0.1880	1.0943	0.2823	1.1880	2.2823
	Mining	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	Construction	1.0000	0.2584	0.8009	0.0593	1.2584	2.0593
	Manufacturing	1.0000	0.2017	0.7947	0.9964	1.2017	1.9964
	TCPU	1.0000	0.2394	1.1020	0.3413	1.2394	2.3413
	Trade	1.0000	0.1752	1.2473	0.4225	1.1752	2.4225
	FIRE	1.0000	0.2246	1.1951	0.4197	1.2246	2.4197
	Services	1.0000	0.2347	1.1774	0.4121	1.2347	2.4121
	Government	1.0000	0.0349	1.3297	0.3646	1.0349	2.3646
	Other	1.0000	0.0000	1.3103	0.3103	1.0000	2.3103

*Total = direct + indirect + induced, ** Type I = direct + indirect, *** Type SAM = Type I + induced

Table 27. Final Demand Multipliers; Forestry Sector; Beaufort Co., SC; 1998

Effects / Industry	Direct	Indirect	Induced	Total*	Type I**	SAM***	
Value Added	All Others	0.6917	0.2063	1.1115	0.0094	1.2982	2.9051
	Ag, Forestry, Fishing	0.6512	0.2312	1.1578	0.0401	1.3550	3.1330
	Pulp & Paper	0.4072	0.2695	0.8594	0.5361	1.6618	3.7726
	Wood Furniture	0.3079	0.3936	0.8940	0.5955	2.2782	5.1815
	Wood Products	0.4231	0.3135	0.9357	0.6723	1.7409	3.9522
Employment	All Others	0.9548	4.1768	0.4458	0.5774	1.2993	2.9078
	Ag, Forestry, Fishing	0.6865	4.7471	0.3810	7.8146	1.1196	1.7088
	Pulp & Paper	0.8445	5.4612	0.3562	6.6620	2.4205	6.9351
	Wood Furniture	0.7564	8.1496	0.0544	9.9604	1.5924	2.9049
	Wood Products	0.7877	6.6295	0.8958	6.3130	1.6145	3.3662
Output	All Others	1.0000	0.2993	1.6085	0.9078	1.2993	2.9078
	Ag, Forestry, Fishing	1.0000	0.3348	1.6755	0.0103	1.3348	3.0103
	Pulp & Paper	1.0000	0.3994	1.2438	0.6432	1.3994	2.6432
	Wood Furniture	1.0000	0.6055	1.2938	0.8993	1.6055	2.8993
	Wood Products	1.0000	0.5054	1.3541	0.8595	1.5054	2.8595

*Total = direct + indirect + induced, ** Type I = direct + indirect, *** Type SAM = Type I + induced

Table 28. Impact Estimates; 50 New Trade Jobs; Type SAM Multipliers; Beaufort Co., SC; 2002 (Deflated)

Total Impact / Industry	Value Added	Employment	Output
Ag, Fishing, Forestry	\$7,072	0	\$10,910
Mining	\$0	0	\$0
Construction	\$82,455	2	\$227,579
Manufacturing	\$6,590	0	\$15,723
TCPU	\$69,092	1	\$114,948
Trade	\$1,297,294	43	\$1,799,144
FIRE	\$244,792	2	\$337,419
Services	\$291,534	9	\$455,941
Government	\$621,641	10	\$654,070
Other	\$12,334	1	\$12,334
Foreign Trade	\$0	0	\$0
Domestic Trade	\$0	0	\$224,119
Total	\$2,632,803	68.7	\$3,852,186

Input-Output Analysis Summary

The input-output analysis of Beaufort County has revealed a continued dependence on Federal government employment and direct income in addition to a growing dependence on the services sector, while also showing that neither contributes to the overall economy in any

significant way via commodity exports or Type SAM multipliers. The forestry sector does not appear to be a major contributor to the county economy either, beyond employment in the pulp and paper industry.

Construction and manufacturing provide the greatest returns to the county economy through direct industry to industry linkages and value added multiplier effects. Manufacturing is also a significant source of leakage for the area, but shows the greatest potential for growth among aggregate sectors. Within both manufacturing and the forestry sector pulp and paper and wood products are also sources of leakage and potential growth factors, while wood furniture shows the greatest potential for expansion into value added manufacturing. However, the possibility to expand production or diversify into other areas (i.e. furniture) within the forestry sector is dependent on many factors, including the characteristics and sustainability of the forest stock.

Conclusion

This analysis suggests that Beaufort County is currently prospering in comparison to the rest of South Carolina and the nation. It has shown a trend of increasing income levels and steady employment rates that exceed national and state averages. And although the county remains dependent on the government sector, the economy has witnessed a fairly rapid and significant degree of diversification over the last fifteen years. Much of that structural change has been in favor of the services industry, but that too is diversified and contains both weak and strong sectors (*see* Appendix for county wide industry breakdown). Yet these are not altogether positive factors as they point further to the necessity to find a means for managing rapid growth and to do so in a sustainable manner. In addition, it was indicated that particular attention needs to be paid to internal change, that is, at the sub-county level, where equitable growth is concerned.

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Appendix

Table A-1. Beaufort County Industry Sectors

Code	Industry	Industry Output*	Employment	Total Value Added*
2	Poultry and Eggs	1.14	10	0.254
3	Ranch Fed Cattle	0.385	12	0.099
4	Range Fed Cattle	0.023	1	0.006
5	Cattle Feedlots	0.048	1	0.011
7	Hogs, Pigs and Swine	0.025	1	0.005
9	Miscellaneous Livestock	0.03	2	0.01
11	Food Grains	0.068	3	0.041
12	Feed Grains	0.377	11	0.242
13	Hay and Pasture	0.1	10	0.054
16	Fruits	0.088	2	0.023
18	Vegetables	2.438	40	1.288
21	Oil Bearing Crops	0.04	2	0.027
22	Forest Products	0.919	25	0.52
23	Greenhouse and Nursery Products	1.379	33	0.748
25	Commercial Fishing	5.895	158	5.349
26	Agricultural, Forestry, Fishery Services	4.243	168	2.763
27	Landscape and Horticultural Services	47.588	1,564	30.561
48	New Residential Structures	227.849	1,793	48.23
49	New Industrial and Commercial Buildings	145.865	1,272	49.211
50	New Utility Structures	33.943	363	13.918
51	New Highways and Streets	26.672	265	10.237
53	New Mineral Extraction Facilities	20.297	292	11.745
54	New Government Facilities	111.272	771	41.178
55	Maintenance and Repair, Residential	41.878	562	16.769
56	Maintenance and Repair Other Facilities	114.733	2,015	70.488
65	Fluid Milk	1.047	3	0.24
75	Blended and Prepared Flour	9.598	27	1.163
95	Bottled and Canned Soft Drinks & Water	1.505	4	0.489
98	Prepared Fresh Or Frozen Fish Or Seafood	2.789	18	0.611
108	Broadwoven Fabric Mills and Finishing	5.64	35	2.527
117	Carpets and Rugs	4.072	19	1.404
124	Apparel Made From Purchased Materials	4.294	51	1.047
125	Curtains and Draperies	0.584	7	0.177
126	Housefurnishings, N.E.C	0.84	6	0.33
128	Canvas Products	0.445	5	0.258
133	Logging Camps and Logging Contractors	3.666	21	1.433
137	Millwork	2.504	26	1.167
138	Wood Kitchen Cabinets	5.504	77	2.368
147	Wood Products, N.E.C	0.966	13	0.381
148	Wood Household Furniture	0.116	2	0.036
162	Paper Mills, Except Building Paper	0.467	1	0.238
164	Paperboard Containers and Boxes	0.625	3	0.206
175	Periodicals	12.494	76	5.41
178	Miscellaneous Publishing	10.305	74	5.68
179	Commercial Printing	13.012	135	4.215

Table A-2. Beaufort County Industry Sectors

Code	Industry	Industry Output*	Employment	Total Value Added*
190	Cyclic Crudes, Interm. & Indus. Organic Chem.	25.32	49	6.871
220	Miscellaneous Plastics Products	12.338	80	3.308
244	Ready-mixed Concrete	5.236	30	2.138
247	Cut Stone and Stone Products	0.032	1	0.014
248	Abrasive Products	0.196	1	0.077
256	Steel Wire and Related Products	15.906	56	5.424
282	Fabricated Structural Metal	4.085	24	1.511
286	Architectural Metal Work	1.91	19	1.102
290	Iron and Steel Forgings	1.805	4	1.239
296	Metal Coating and Allied Services	7.363	22	4.639
311	Construction Machinery and Equipment	15.507	59	3.529
319	Machine Tools, Metal Forming Types	1.208	9	0.538
359	Relays & Industrial Controls	8.93	59	2.994
369	Lighting Fixtures and Equipment	2.35	16	0.733
377	Semiconductors and Related Devices	85.783	437	51.048
391	Aircraft and Missile Equipment,	22.453	185	8.196
393	Boat Building and Repairing	2.235	26	0.676
429	Signs and Advertising Displays	5.416	57	2.708
433	Railroads and Related Services	1.08	6	0.648
434	Local, Interurban Passenger Transit	13.88	427	7.45
435	Motor Freight Transport and Warehousing	47.535	471	19.547
436	Water Transportation	11.435	72	2.586
437	Air Transportation	16.434	198	10.42
439	Arrangement Of Passenger Transportation	2.497	81	1.821
440	Transportation Services	0.732	15	0.457
441	Communications, Except Radio and TV	148.967	579	96.148
442	Radio and TV Broadcasting	9.231	79	3.603
443	Electric Services	37.276	126	30.573
445	Water Supply and Sewerage Systems	1.081	11	0.702
446	Sanitary Services and Steam Supply	6.798	73	4.529
447	Wholesale Trade	109.822	1,104	75.175
448	Building Materials & Gardening	42.948	784	37.863
449	General Merchandise Stores	33.191	1,114	26.712
450	Food Stores	51.759	1,841	48.487
451	Automotive Dealers & Service Stations	60.541	1,091	52.431
452	Apparel & Accessory Stores	45.3	1,206	33.631
453	Furniture & Home Furnishings Stores	28.081	602	24.112
454	Eating & Drinking	246.488	6,626	139.122
455	Miscellaneous Retail	66.715	2,049	56.283
456	Banking	47.747	340	35.615
457	Credit Agencies	30.355	1,309	26.51
458	Security and Commodity Brokers	13.389	139	10.457
459	Insurance Carriers	13.158	74	8.134
460	Insurance Agents and Brokers	9.364	236	7.279
461	Owner-occupied Dwellings	323.23	0	247.455
462	Real Estate	762.969	4,555	535.284

Table A-3 Beaufort County Industry Sectors

Code	Industry	Industry Output*	Employment	Total Value Added*
463	Hotels and Lodging Places	174.876	3,096	116.537
464	Laundry, Cleaning and Shoe Repair	20.161	1,059	15.16
465	Portrait and Photographic Studios	4.597	65	2.665
466	Beauty and Barber Shops	15.678	554	10.2
467	Funeral Service and Crematories	1.818	60	1.252
468	Miscellaneous Personal Services	5.998	103	1.764
469	Advertising	11.22	130	6.772
470	Other Business Services	19.995	305	11.183
471	Photofinishing, Commercial Photography	3.635	44	1.979
472	Services To Buildings	35.342	1,044	22.651
473	Equipment Rental and Leasing	6.416	94	3.72
474	Personnel Supply Services	7.55	301	6.955
475	Computer and Data Processing Services	8.452	111	5.524
476	Detective and Protective Services	7.641	219	5.697
477	Automobile Rental and Leasing	3.435	58	2.216
478	Automobile Parking and Car Wash	2.943	86	2.206
479	Automobile Repair and Services	24.033	322	13.209
480	Electrical Repair Service	10.515	158	4.651
481	Watch, Clock, Jewelry and Furniture Repair	3.26	54	1.413
482	Miscellaneous Repair Shops	2.468	40	1.068
483	Motion Pictures	16.812	278	3.323
484	Theatrical Producers, Bands Etc.	4.355	56	1.574
485	Bowling Alleys and Pool Halls	1.179	58	0.709
486	Commercial Sports Except Racing	3.11	40	1.467
487	Racing and Track Operation	0.207	4	0.109
488	Amusement and Recreation Services, N.E.C.	78.266	2,132	52.456
489	Membership Sports and Recreation Clubs	13.945	371	8.648
490	Doctors and Dentists	64.105	754	42.389
491	Nursing and Protective Care	9.831	323	7.08
492	Hospitals	51.105	639	35.859
493	Other Medical and Health Services	20.865	411	11.503
494	Legal Services	39.534	570	31.034
495	Elementary and Secondary Schools	11.681	396	6.715
497	Other Educational Services	7.231	136	3.539
498	Job Trainings & Related Services	4.652	111	2.066
499	Child Day Care Services	8.478	242	3.471
500	Social Services, N.E.C.	9.53	201	4.537
501	Residential Care	10.591	324	7.776
502	Other Nonprofit Organizations	1.033	35	0.47
503	Business Associations	5.156	130	3.35
504	Labor and Civic Organizations	43.335	1,940	38.229
506	Engineering, Architectural Services	55.225	724	21.998
507	Accounting, Auditing and Bookkeeping	17.366	403	15.653
508	Management and Consulting Services	117.573	1,232	76.411
509	Research, Development & Testing Services	0.531	12	0.31
511	State and Local Electric Utilities	14.24	27	5.828
512	Other State and Local Govt Enterprises	38.627	225	16.222

Table A-4 Beaufort County Industry Sectors

Code	Industry	Industry Output*	Employment	Total Value Added*
513	U.S. Postal Service	14.579	198	10.479
515	Other Federal Government Enterprises	47.139	457	20.524
519	Federal Government - Military	851.962	11,504	851.962
520	Federal Government - Non-Military	88.353	2,201	88.353
522	State & Local Government - Education	86.875	2,978	86.875
523	State & Local Government - Non-Education	117.356	2,435	117.356
525	Domestic Services	13.426	1,378	13.426
528	Inventory Valuation Adjustment	17.497	0	17.497
	Totals	5,525.98	77,172	3,818.27

*Millions of Dollars