Short-term Employment, Income and Output Consequences of a Decline in Flue-cured Tobacco Production: The Case of Southside Virginia

by

William B. Wise

Thesis submitted to the Faculty of the

Virginia Polytechnic Institute and State University

in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

IN

AGRICULTURAL AND APPLIED ECONOMICS

APPROVED:

Dr. Dixie Watts Reaves, chair

Dr. Wayne D. Purcell

Dr. Bradley J. Sullivan

July 1996

Blacksburg, Virginia

Key words: Tobacco, Economic Impacts, Input-Output Analysis, IMPLAN

Short-term Employment, Income and Output Consequences of a Decline in Flue-cured Tobacco Production: The Case of Southside Virginia

by

William B. Wise

Dr. Dixie Watts Reaves, Chairman

Agricultural and Applied Economics

(ABSTRACT)

This study has objectives that address current concerns about the possibility of a sudden, negative, shock in domestic consumption of tobacco products. A mostly rural, six-county region of south-central Virginia is the area selected for a focus on these concerns. The study conducts a regional descriptive analysis to introduce the study area and its economic base, and this includes a focus on the regional tobacco trade. Estimates of the economic contribution of tobacco to the study area are generated using input-output analysis and the IMPLAN model. Survey data, interviews and other published sources are employed to verify and change portions of the IMPLAN base model data and to supplement the results.

Tobacco's contribution to the regional economy is estimated for the tobacco production and tobacco stemming and redrying industries, and for other industries and groups. In total, tobacco contributes $756 million in total industry output, nearly $251 million to the

value added portion of output and over 6800 jobs. This represents approximately 10.9 percent, 7.5 percent and 6.7 percent of the regional base economy, respectively.

Some policy perspectives relating to tobacco production are also analyzed. Economic losses for this study area due to absentee tobacco quota ownership are found to be relatively insignificant when compared to the total regional contribution of tobacco. The regional economic impact of a ten percent decrease in tobacco marketing quota, a ten percent decrease in margin earned by tobacco producers, and two other policy considerations is also estimated.

Acknowledgments

I wish to thank Virginia's Rural Economic Analysis Program for its financial support for this study. Next, I would like to provide a special thank you to my advisor and committee chair, Dixie Watts Reaves. Besides providing guidance, ideas and countless hours of review, Dr. Reaves called on her invaluable background and experience to introduce me to the tobacco industry and many important contacts required for the study. I would also like to thank my two other committee members, Wayne Purcell and Jay Sullivan, for their time and assistance. Dr. Sullivan provided advice in several important areas of input-output analysis. All of the faculty, staff and fellow students at Virginia Tech have been helpful and provided encouragement, contributing to an excellent learning experience. Finally, and most significantly, I wish to thank my wife, Meliza.

TABLE OF CONTENTS

	Page
Abstract	
Acknowledgments	iv
List of Tables	x
List of Figures	xv
Chapter I. Introduction	
I.1 Tobacco Production: Its Significance to Virginia and its Regions	1
I.2 Tobacco Stemming and Redrying in Southside Virginia	3
I.3 The Tobacco Program	4
I.4 Trends in National Tobacco Production	5
I.5 Previous Studies	6
I.6 Use of Input-Output Analysis and IMPLAN	7
I.7 Objectives of the Study	9
I.8 Study Organization	10
Chapter II. Current Issues Facing Tobacco Producers	
II.1 Current Issues	11
II.2 Tobacco Program Policy	12
II.2.1 Marketing Quotas as a Supply Control	12
II.2.2 Quota Transfer Restrictions	13
II.2.3 Quota Establishment	14
II.2.4 Mechanics of Price Supports	14
II.2.5 No-Net-Cost Assessments	16
II.2.6 Remaining Government Expenditures	17
II.2.7 Manufacturers' Buyout	18
II.2.8 The 1995 Farm Bill	19
II.3 Factors Influencing the Tobacco Program	19
II.3.1 Health-Related Concerns	19
II.3.2 Tax Issues	21
II.3.3 General Agreement on Tariffs and Trade	23
II.3.4 Export Situation and Prices	24
II.4 Conclusion	25
II.4.1 Impact of Issues on the Tobacco Industry	25

II.4.2 Future Considerations 27

Chapter III. Choice of Region

III.1 Introduction 28
III.2 What Constitutes a Region? 28
III.2.1 The Role of "Linkages" 31
III.2.2 The Role of "Leakages" 32
III.3 Influence of Geography on a Region 32
III.4 Regional Selection Criteria According to Input-Output Literature 34
III.4.1 Functional Economic Areas 35
III.4.2 Region Size 36
III.4.3 Selection Criteria Summary 38
III.5 Influence of Study Objectives 38
III.5.1 Virginia Flue-cured Tobacco Production 38
III.5.2 North Carolina Flue-cured Tobacco Production 43
III.5.3 Tobacco Stemming and Redrying Processing 44
III.5.4 Other Virginia Tobacco-related Operations 48
III.6 Statistical Boundaries 51
III.6.1 Agricultural Statistical Boundaries 51
III.6.2 Metropolitan Statistical Areas 56
III.6.3 BEA Economic Areas 56
III.6.4 Trading Areas 57
III.6.5 Summary 60
III.7 Roads 60
III.8 Commuting Patterns 61
III.9 Border County Dilution 65
III.10 "Southside" Virginia: What's in a Name? 69
III.11 Regional Choice Conclusion 71

Chapter IV. Regional Descriptive Analysis

IV.1 Introduction 73
IV.2 Demographic Information 75
IV.3 Economic Comparisons at a Highly Aggregated Level 78
IV.4 Economic Comparisons at a Disaggregated Level 86
IV.4.1 Regional Diversity and Dependency 86
IV.4.2 Sector Interconnectedness 93
IV.5 A Focus on Tobacco 100
IV.5.1 Tobacco Trade Patterns 100
IV.5.2 Tobacco Producers 103

IV.5.2.1 Tobacco Producers' Share of Southside and Virginia Agriculture 103
IV.5.2.2 Tobacco Producers' Share of Southside Industry 104
IV.5.2.3 About Tobacco Producers 105
IV.5.2.4 Tobacco Production Process and Input Use 107
IV.5.2.5 Flue-cured Quota Rights 111
IV.5.2.6 Absentee Quota Owners 115
IV.5.3 Marketing Tobacco at Warehouses 119
IV.5.3.1 Marketing Process 120
IV.5.3.2 Southside Virginia Tobacco Warehouse Survey 121
IV.5.3.3 Conclusion 126
IV.5.4 Tobacco Stemming and Redrying Operators 127
IV.5.4.1 Stemming and Redrying Process 127
IV.5.4.2 Southside Stemming and Redrying Operators 128
IV.5.4.3 Stemming and Redrying Inputs and Linkages 130
IV.5.4.4 Industry Interrelations 135
IV.5.5 Tobacco End Products and Consumption 139
IV.6 Conclusion 140

Chapter V. Input-output Analysis Theory and IMPLAN Techniques: A Review of the Literature

V.1 Introduction 142
V.2 History of Input-Output 143
V.3 Basic Input-Output Accounting Framework 143
V.3.1 Social Accounting Matrices 144
V.3.2 Input-Output Transactions Table 144
V.3.3 The Input-Output Matrix and Direct Requirements Table 146
V.3.4 Leontief Method 147
V.3.5 Direct, Indirect and Induced Effects 148
V.4 Assumptions and Limitations of Input-Output 149
V.5 Rectangular Accounting Framework 153
V.6 IMPLAN Model 154
V.6.1 Basic Features of IMPLAN 155
V.6.2 National Production Function 156
V.6.3 Regional Accounting Data 158
V.6.4 Regional Purchase Coefficients 164
V.6.5 IMPLAN Specific Accounting - The Induced Effect 171
V.6.6 Scenario Development 174
V.7 Multipliers 181

V.8 Agricultural Applications - Literature Review 185

Chapter VI. Empirical Model and Results

VI.1 Introduction 196
VI.2 A Review of the Issues 196
VI.3 Production Function Changes 199
VI.4 Regional Total Output for Tobacco and Tobacco Stemming and Redrying 204
VI.5 Trade Flow Data and Regional Purchase Coefficients 208
VI.6 Scenarios 212
VI.6.1 Basic Model Structure 212
VI.6.2 Scenario Descriptions and Results 219
VI.6.2.1 Tobacco-Related Economic Contribution 220
VI.6.2.2 Tobacco Industry Adjustments 229
VI.6.3 Sectoral Impacts 235

Chapter VII. Summary and Conclusions

VII.1 Summary 244
VII.2 Conclusions 248
VII.3 Study Caveats and Recommendations 251

References 253

Appendices

Appendix 1.1 CFSA Tobacco Quota Report - Example Page 263
Appendix 1.2 Quota Report Calculations - Input Example Page 264
Appendix 1.3 Explanation of Absentee Quota Ownership Calculations 265
Appendix 2 Southside Tobacco Warehouse Survey 267
Appendix 3 Southside Stemming and Redrying Operator Survey 270
Appendix 4.1 Comparison of USDA and Virginia Central District Farm Management Flue-cured Tobacco Budgets 272
Appendix 4.1.1 Hired Labor Expenditure Detail 273
Appendix 4.2 Bridging Table for Industry 15 (Tobacco) Production Function 274
Appendix 4.3 Industry 15 (Tobacco) Production Function - Final Allocation Compared with the Original IMPLAN Allocation 279
Appendix 5.1 Calculation of All Effects - Tobacco Output 282

Appendix 5.2 Calculation of All Effects - Stemming and Redrying Output 283
Appendix 5.3 Calculation of All Effects - Total Industry Output 284
Appendix 5.4 Calculation of All Effects - Total Value Added 285
Appendix 5.5 Calculation of All Effects - Total Employment (Jobs) 286

Vita 287

List of Tables

Table 2.1	Selected Legislative Changes in the Tobacco Program	13
Table 3.1	*Study Region* Tobacco Production Figures for 1993	39
Table 3.2	Virginia Counties Outside the *Study Region* with 1993 Flue-cured Production Over One Million Pounds	40
Table 3.3	Virginia Counties Ranked by Tobacco Sales as a Percentage of Household Income	42
Table 3.4	Flue-cured Tobacco Production in North Carolina Counties Adjacent to the *Study Region*	43
Table 3.5	Flue-cured Stemming and Redrying Plants	45
Table 3.6	U.S. Tobacco Manufacturing Statistics for 1992	49
Table 3.7	Virginia Flue-cured Type 11 Tobacco Market Statistics	54
Table 3.8	North Carolina Flue-cured Type 11 Tobacco Market Statistics	54
Table 3.9	Flue-cured Tobacco Cross-Border Sales Between Virginia and North Carolina	56
Table 3.10	Southside Virginia Employment Commuter Flows	62
Table 3.11	*Study Region* Cities and Towns Greater than 1,000 in Population	66
Table 3.12	Larger Cities and Towns in Virginia Counties Bordering the *Study Region*	67
Table 3.13	Larger Cities and Towns in North Carolina Counties Bordering the *Study Region*	69
Table 4.1	Regional Total Population and Farm Population Comparison	76
Table 4.2	Regional Population Age and Education Indicators	77
Table 4.3	Regional Social Welfare Indicators	78

Table 4.4	Regional Farm and Manufacturing Earnings	79
Table 4.5	1992 Southside *Study Region* Base Economy Aggregated by 1-Digit Standard Industrial Classification Code	80
Table 4.6	Southside 1992 Top Ten Sectors Ranked by Total Industry Output	87
Table 4.7	Southside 1992 Top Ten Sectors Ranked by Value Added	88
Table 4.8	Southside 1992 Top Ten Sectors Ranked by Employment (in Jobs)	89
Table 4.9	Southside 1992 Top Ten Sectors Ranked by Exports (Foreign and Domestic)	90
Table 4.10	Southside 1992 Top Ten Sectors for Export Share of Value Added	92
Table 4.11	Southside 1992 Top Ten Sectors for Export Share of Employment (Jobs)	92
Table 4.12	Southside 1992 Value Added Ranked by Total Effects - Top 25 Sectors	95
Table 4.13	Southside 1992 Value Added Ranked by Type III Multiplier - Top 25 Sectors	96
Table 4.14	Southside 1992 Employment (Jobs) Ranked by Total Effects - Top 25 Sectors	97
Table 4.15	Southside 1992 Employment (Jobs) Ranked by Type III Multiplier - Top 25 Sectors	98
Table 4.16	Regional and State Comparison of Tobacco Farms and All Farms, for those Farms with Sales Over $10,000	104
Table 4.17	Virginia Flue-cured Tobacco Budget per Acre, for a Farm of Approximately 50 Acres in Size	110
Table 4.18	Tobacco Quota Ownership Information for the Southside *Study Region*	118

Table 4.19	Southside Virginia Tobacco Buyer Distribution - 1995 Survey Results	122
Table 4.20	Warehouse Survey Response Compared to Sales by Market	123
Table 4.21	Tobacco Buyer Distribution - Comparison of Estimate with Survey Results	124
Table 4.22	Survey Results on 1995 Southside Warehouse Employment	126
Table 4.23	Tobacco Stemming and Redrying Operations Budget and Share of Output	132
Table 4.24	1995 Southside Stemming and Redrying Survey - 1995 Processing of Tobacco Inputs (Thousands of Pounds)	134
Table 4.25	Southside Stemming and Redrying Survey - 1995 Processor Purchases of Flue-cured Tobacco (Thousands of Pounds)	135
Table 4.26	1995 Southside Stemming and Redrying Survey - Combined Response for 1995 Employment	135
Table 4.27	Market Share for U.S. Cigarette Manufacturers	140
Table 5.1	Example 1992 Regional Accounting Data for the Southside *Study Region*	161
Table 5.2	IMPLAN Trade Flows for Tobacco, Sector 15, Southside *Study Region*	166
Table 6.1	Sectors with the Highest Change in the Production Function Allocation	203
Table 6.2	1992 Tobacco Industry Output for the Southside *Study Region*	204
Table 6.3	1992 and 1995 Southside *Study Region* Tobacco Industry Output	206
Table 6.4	Estimate of 1995 Tobacco Stemming and Redrying Output for the Southside *Study Region*	207

Table 6.5	1995 Southside *Study Region* Flue-cured Tobacco Purchases and Use	208
Table 6.6	1995 Southside *Study Region* Flue-cured Tobacco Trade Flows	209
Table 6.7	Southside *Study Region* Tobacco Regional Purchase Coefficient Estimation	210
Table 6.8	Components of Gross Change in Final Demand (Activity Levels) Assigned to Each Scenario	213
Table 6.9	Scenario Summary Measures Resulting from the Change in Final Demand	218
Table 6.10	Allocation of Personal Consumption Expenditures to Low or Medium Income Levels	222
Table 6.11	Estimated Payroll Deduction and Savings Levels	223
Table 6.12	Regional Personal Consumption Expenditure Losses Due to Absentee Quota Ownership	225
Table 6.13	Net Change in Summary Results for the Regional Economic Contribution Scenarios	226
Table 6.14	Net Change in Summary Results for the Tobacco Industry Adjustment Scenarios	232
Table 6.15	Sectors with the Greatest Employment Impact (ABSENTEE)	236
Table 6.16	ABSENTEE Scenario Tobacco Industry Impacts Aggregated by 1-Digit Standard Industrial Classification Code	238
Table 6.17	Adjusted 1992 Southside *Study Region* Base Economy Aggregated by 1-Digit Standard Industrial Classification Code	239
Table 6.18	ABSENTEE Scenario Results as a Percentage of the Southside *Study Region* Base Economy	240
Table 6.19	QUOTA10 Scenario Tobacco Industry Impacts Aggregated by 1-Digit Standard Industrial Classification Code	241

Table 6.20 RPROFIT Scenario Tobacco Industry Impacts Aggregated by 1-Digit Standard Industrial Classification Code 242

Table 6.21 NOQUOTA Scenario Tobacco Industry Impacts Aggregated by 1-Digit Standard Industrial Classification Code 243

List of Figures

Figure 1.1	Flue-cured Tobacco Marketing Quota Since 1975	5
Figure 2.1	Effective Quotas Since 1980 for Burley and Flue-cured Tobacco	15
Figure 2.2	Producer No-Net-Cost Assessments Since 1986 for Burley and Flue-cured Tobacco, Marketing Assessments Excluded	17
Figure 2.3	United States Cigarette Output and Consumption Since 1970	20
Figure 3.1	Southside Virginia	29
Figure 3.2	1993 Flue-cured Tobacco Production in Virginia and North Carolina by County	41
Figure 3.3	Location of Stemming and Redrying Operations in Virginia and North Carolina	48
Figure 3.4	Virginia Agricultural Statistic Districts Covering the *Study Region*	53
Figure 3.5	Flue-cured Type 11 Tobacco Markets in Virginia and North Carolina	55
Figure 3.6	Commuting Patterns for Southside Virginia	64
Figure 3.7	Southside Workers From Outside the *Study Region*	65
Figure 3.8	Border Cities and Towns of Southside Virginia	68
Figure 4.1	Categorization of the Economy for Total Industry Output	81
Figure 4.2	Categorization of the Economy for Value Added	83
Figure 4.3	Categorization of the Economy for Jobs	84
Figure 4.4	Demand Components of Total Industry Output	85
Figure 4.5	Tobacco Production Backward and Forward Linkages	101
Figure 4.6	Simplified Tobacco Industry Schematic of Forward Linkages	102

Figure 6.1 Schematic of the Total Effects Calculated Using the First Model Structure 214

Figure 6.2 Schematic of the First and Second Model Structures Combined to Calculate the Total Effects 217

Chapter I

Introduction

I.1 Tobacco Production: Its Significance to Virginia and its Regions

In Virginia and Maryland Tobacco is our Staple, is our ALL, and Indeed leaves no room for anything else: It requires the attendance of all our hands, and Exacts their utmost labor, the whole year round.

--Phillips, *Plantation and Frontier*. Quote taken from Siegel, p. 61.

No commodity has played a more central role in Virginia's development since colonization than tobacco; it embodies the Commonwealth's history. Today, tobacco production remains important to Virginia agriculture. The 1994 Virginia Agricultural Statistics ranks tobacco fifth in cash receipts and first among crops, with receipts of nearly $169 million[1]. Despite such lofty numbers, tobacco ranks only seventh in total harvested acres out of all the crops for the state (Virginia Agricultural Statistics, 1994, p. 2). This correctly suggests that tobacco is high in cash receipt contribution per acre.

[1]The 1993 ranking of tobacco was fourth due to higher receipts of approximately $181 million (Virginia Agricultural Statistics, 1993, p. 2).

Historically it has also been a profitable crop, partly as the result of a federal government program that has continued in some form since the 1930s. Given the economics of the crop, tobacco farmers are typically resistant to switch to other crops.

The two most significant types of tobacco grown in Virginia are burley and flue-cured. Burley is generally grown in the south-western part of Virginia, while flue-cured is grown in the south-central counties, a region frequently referred to as Southside Virginia. Flue-cured (Type 11 tobacco) is the larger crop, more than trebling the total production of burley in the state (Virginia Agricultural Statistics, 1994, pp. 44-45). The flue-cured producing region also benefits from a related tobacco stemming and redrying industrial presence not found in the burley producing south-western counties. For these two reasons flue-cured tobacco and the Southside region are selected for this study. This does not presume that tobacco is more important to the Southside region, only that it makes a larger contribution on a state-wide basis.

For the purpose of this study, Southside Virginia is defined as Brunswick, Charlotte, Halifax, Lunenburg, Mecklenburg, and Pittsylvania counties. This geographically contiguous six-county region encompasses both the six largest flue-cured producing counties in the state, and the smaller Danville Metropolitan Statistical Area. Chapter III provides the rationale for this regional definition.

Both types of tobacco are more labor and capital intensive than other widely grown crops in the region such as corn, soybeans and wheat. Thus, tobacco makes a larger per acre contribution to employment and supporting businesses than many other crops. This is an important factor when evaluating the economic contribution of tobacco to a region. Some economic *sectors*, or groups of similar industries and institutions, are more dependent on the tobacco trade than others. Agribusinesses that supply many of the inputs necessary for tobacco production are one example. In addition, there are those industries that

perform further processing of tobacco, thereby adding value to it and possibly changing its next intended use. Stemming and redrying is one such tobacco industry.

I.2 Tobacco Stemming and Redrying in Southside Virginia

The basic purpose of the stemming and redrying process is to remove the stems that are approximately 25 per cent of the leaf weight, and to bring the tobacco to a uniform moisture content. In combination with a blending process, this improves the product's uniformity and allows it to be stored for a longer length of time than in its former state. Large, capital intensive, mechanical units perform the threshing, separating and redrying operations (Dibrell Brothers Incorporated, pp. 2-3; Marshall; and Monk-Austin, Inc., Form 10-K, p. I-1).

The 1995 Virginia Industrial Directory identifies three companies in the Southside region that are primarily engaged in stemming and redrying operations. These companies, located in the city of Danville or surrounding Pittsylvania County, have a combined employment of nearly 1,400[2] (Virginia Chamber of Commerce, pp. 67-69 and 601). However, the total regional employment impact is larger, because there are additional regional jobs created by the presence of the stemming and redrying industry. The size of this job creation depends on the amount of regionally produced inputs purchased by the stemming and redrying firms and the size of regional wage-supported expenditures made by their employees.

Because these operations use tobacco as an input, the implication is that the more Southside-produced tobacco the stemming and redrying firms purchase, the greater the economic contribution to the region. In other words, tobacco purchases made outside the

[2] Chapter III will address changes that have occurred to these companies since the time of publication of the directory.

region, or imports, do not have the same impact. In order to correctly quantify the contribution of stemming and redrying to the economic well-being of every sector, it is important to control for expenditures that go outside the region, a condition often referred to as *leakages*. Chapter VI will examine these leakages, and will consider the ramifications of a tobacco policy that controls supply and maintains regional market share. A different leakage, or lost opportunity, from stemming and redrying is incurred when tobacco grown in the Southside region is stemmed and redried outside the region. Accordingly, this study will also examine implications of changing regional shares in the stemming and redrying market.

Besides regional leakages, there are also global trade ramifications to consider. United States' stemming and redrying companies are continually increasing their operations overseas. One reason is that U.S. tobacco costs more. Dibrell Brothers, a Danville-based company, indicates that the U.S. tobacco program causes the tobacco to be more expensive than most foreign-grown tobacco, and this has contributed to an increase in importance in their overseas operations[3] (Dibrell Brothers, Incorporated, p. 2).

I.3 The Tobacco Program

The *Tobacco Program* is a name commonly applied to a group of tobacco-related government programs. Due to its pervasive influence on the tobacco industry, any study of the impact of tobacco must be grounded in an understanding of this program. Chapter II will provide a history of the tobacco program and an analysis of its current provisions.

One aspect of the tobacco program is supply control achieved by marketing rights. For flue-cured tobacco, these marketing or quota rights can be sold as long as they remain in the same county. Alternatively, if the tobacco producer desires to produce tobacco in excess of his quota ownership, he or she can rent and produce on other quota owners'

[3]Dibrell Brothers is now part of the entity DIMON, Inc.

land. A premium paid to use this land, greater than the prevailing land rental rate, is referred to as a *quota rent*. This premium captures some of the expected profits the marketing quota provides. This facet of the tobacco program introduces a unique leakage in the case of *absentee quota owners*, or those quota owners that do not reside in the region. It is not likely that the quota rental proceeds of absentee quota owners will be spent in the region. Leakages of quota rentals are interesting to policy makers, because they reduce the magnitude of changes to related economic sectors for a decline (or increase) in tobacco production in the region. Chapter VI will examine these leakages.

I.4 Trends in National Tobacco Production

The case has been made for the importance of flue-cured tobacco to Southside Virginia and the role of the tobacco program in cementing that relationship. The title of this study suggests the possibility of a decline in flue-cured tobacco production. Such a decline has actually been on-going for some time. The annual effective quota for the last 21 years for flue-cured tobacco reflects this decline as seen in Figure 1.1. The 1975 quota is 1,572 million pounds, a peak over previous years. The quota for 1996 is 944 million pounds (U.S. Department of Agriculture, December 1995, p. 9).

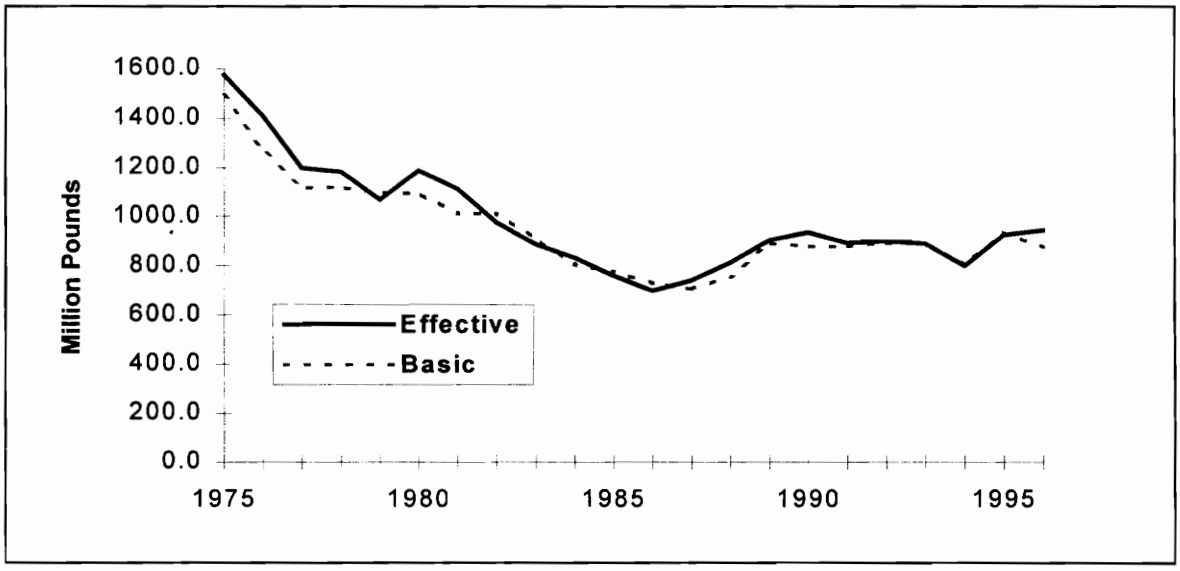


Figure 1.1 Flue-cured Tobacco Marketing Quota Since 1975

Many industry observers believe that the future may hold further declines in tobacco production nationally and/or regionally. There are essentially two intertwined reasons for this forecast: a decline in demand for tobacco and changes in the tobacco program. Health concerns and health-related legislation are highly visible factors that may cause a decline in demand for U.S. tobacco and/or changes to the tobacco program, but many less visible factors are also present. Chapter II will provide an in-depth analysis of these issues and their implications.

I.5 Previous Studies

No previous study of this nature and scope for the Southside region is found, although three studies are related. The oldest of these is a doctoral dissertation in Agricultural Economics at Clemson University. It is closest to this study in its objectives. This 1989 study uses a linear programming model to simulate different policy scenarios for a changing tobacco program. These results are fed into an input-output model to examine the impact of each policy change on different economic sectors in South Carolina. It suggests that those agribusinesses that supply tobacco production inputs are impacted the most (Sureshwaran). The study uses an input-output model that is simple by today's standards. It can be improved upon by applying a more sophisticated input-output tool now available: IMPLAN. In addition, regional differences, such as the lack of a stemming and redrying industrial presence in South Carolina, warrant the need for a separate study for Virginia.

Two more recent studies, published in 1994, use IMPLAN, the same tool proposed for this study. The first of these looks at the economic impact of agriculture on the Commonwealth of Virginia, divided into seven agricultural districts. It highlights the importance of agriculture, including tobacco, to the Virginia economy (Johnson and Wade). The second study is a national study of the economic impact of tobacco farming on 24 different regions throughout the country (Gale). This study intends to be more

focused in regional definition and purpose than these two studies. As a result, it will be more feasible to improve the accuracy of the IMPLAN base data and projections for the study area. Finally, this study proposes to perform additional policy simulations using IMPLAN.

I.6 Use of Input-Output Analysis and IMPLAN

This study will apply *input-output analysis* using the Leontief inverse matrix of output multipliers. One feature of this method is that it allows the impact of a change in demand for one industry to be measured for all other industries or sectors in a region. Another name for this is *impact analysis*. For example, output *multipliers* can be created for each sector that tell the increase in total output for an increase in final demand for any other sector. Micro IMPLAN is the tool that will be used to conduct the input-output analysis. Chapter V will provide justification for the selection of input-output analysis and IMPLAN, as well as additional detail on the theory and key assumptions behind input-output analysis and the techniques specific to IMPLAN.

The IMPLAN database contains information on employment, income and output, allowing multipliers to be created for employment, personal income, total income, value added and output. These *economic indicators* provide many of the most common measures used by policy makers. Chapter V will define and explain their use. Information taken from IMPLAN models prior to any impact analysis can be used for preparing a *descriptive analysis*. Such an analysis "examines current economic activity levels or the interrelationship between existing industries and institutions" (Siverts, p. 22). The descriptive analysis is an important component of planning, and it will be discussed in Chapter IV.

One aim of this study is to improve on previous applications through a better definition of *regional economic attributes*. This will be accomplished by making changes to IMPLAN

default data to better reflect the region, and particularly tobacco, where feasible. Siverts (1994), provides four general reasons for changing the default data used in IMPLAN calculations: 1) there has been a change in the industries present in the region since the time of the default data collection; 2) a simulation of a change in the industries present is desired; 3) the regional industrial production and consumption mix (technology) is different from national averages; and 4) regional trade relationships are different from those specified by the default data (Siverts, pp. 12-14).

All four of the reasons for changing IMPLAN default data are potentially valid for this study. For example, national technology averages can be improved upon. There are differences between the inputs used and output achieved for the two most significant tobacco crops, burley and flue-cured. Thus the national average, which incorporates both crops, will not be accurate for this flue-cured producing region. Similarly, there is concern that IMPLAN controls over the regional trade relationships for tobacco stemming and redrying may not be accurate and can be improved upon with superior regional information. Secondary data will be used where possible to improve regional information. Otherwise, interviews and surveys will be conducted as needed and where feasible.

In addition to correcting deficiencies, default data in IMPLAN can be changed to simulate different policy scenarios such as a new industry in the region. Additionally, the user can perform an impact analysis by making different changes in final demand. In combination, almost any kind of policy change, or scenario, can be simulated. At the same time an evaluation of impacts on different sectors, such as those for agribusiness, can be conducted. Appropriate caution about the limitations of these forecasts will be explained during their presentation. It should also be noted that assumptions implicit in input-output analysis make it better suited for short-term analysis; hence the modifier in the title of this study.

I.7 Objectives of the Study

The case has been made for the importance of flue-cured tobacco production and tobacco stemming and redrying operations to Southside Virginia. A review of applicable studies and of input-output analysis using IMPLAN (see Chapter V) indicates that an improved study incorporating better regional economic attributes can be made. A study of this nature that also prepares a descriptive analysis can make a useful contribution to policy makers by providing estimates of tobacco's importance to the region and its economic sectors. A secondary purpose of this study is to examine two leakages pertaining to tobacco that have important policy implications. Finally, measurement of potential changes to the region's economic sectors under different negative policy and environment outcomes for tobacco are proposed.

Accordingly, the following objectives are established for the Southside region:

1. To provide an improved estimate of tobacco's total employment, income, and output contribution (economic indicators) across sectors by:
   a. incorporating superior regional information into the base IMPLAN model; and
   b. preparing a detailed descriptive analysis suitable for policy makers.

2. To forecast the extent of leakages in terms of the economic indicators across sectors for:
   a. absentee quota owners; and
   b. tobacco inputs to stemming and redrying operations.

3. To forecast the proportional change in employment, income, and output across sectors for scenarios reflecting different potential causes for a decline in tobacco production.

I.8 Study Organization

In order to accomplish the objectives of this study, a number of different tasks will be undertaken. The six remaining chapters of the thesis are organized around these tasks. First, the policy environment and issues surrounding tobacco production will be explained. This is the aim of Chapter II. Second, the study region needs to be selected and described. Chapters III and IV have that aim. Third, the underlying theory and techniques of the proposed method of analysis will be surveyed in a literature review, presented in Chapter V. Fourth, the actual model specification and results will be provided in Chapter VI. The last chapter, Chapter VII, will analyze the results and present the conclusions. It will end with an analysis of the caveats of the research and the scope for future work.

Chapter II

Current Issues Facing Tobacco Producers

II.1 Current Issues

Tobacco producers are confronted with a number of issues that could significantly impact the tobacco industry. The issues can be divided into two categories: those relating to the tobacco program and those relating to tobacco consumption levels.

In the first category are a number of issues that may force changes to the tobacco program:

- *further pressures to reduce any form of government support for tobacco;*
- *implementation of the provisions of the General Agreement on Tariffs and Trade; and*
- *lack of export competitiveness.*

Significant issues that could reduce consumption levels of domestic tobacco production are found in the second category:

- *health concerns and health-related legislation;*
- *potential increases in taxes on cigarettes; and*
- *stronger competition with foreign producers.*

While sources of change may be coming from different directions, some changes are inter-related. The federal government has a role in many of these potential changes, often relating to the long-standing government involvement in the tobacco program.

II.2 Tobacco Program Policy

More than 60 years ago, Federal legislation initiated the tobacco program, a name commonly applied to a group of tobacco-related government programs. Since that time the program has undergone numerous revisions, but the intent of the program has remained unchanged: farm-level price and supply stability. This aim is accomplished through a combination of supply control and price support programs. Table 2.1 contains a chronology of selected changes to the program since its inception. The emphasis in the 1990s has been on the increasingly competitive world market.

II.2.1 Marketing Quotas as a Supply Control

The two predominant classes of tobacco, flue-cured and burley, are part of the program. Supply control for these classes of tobacco is accomplished through quotas, which limit the number of acres that a producer can plant and the number of pounds that the producer can market. In the early years of the program, these quotas were solely acreage allotments, but the emphasis shifted to poundage allotments in the 1960s, partly in an attempt to improve quality (Mann, p. 59). Most quota rights accrued to tobacco producers at the time the program started in the 1930s, although some new rights have been awarded since the inception of the program.

Table 2.1 Selected Legislative Changes in the Tobacco Program

YEAR	LEGISLATION	IMPACT
1933	Agricultural Adjustment Act of 1933	First attempt at supply control for tobacco
1938	Agricultural Adjustment Act of 1938	Basis for current program: introduces marketing quotas in 1940 after producer referendum
1949	Agricultural Act of 1949	Current authority for price supports; continues supports at 90 percent of parity
1962	Public Law 87-200	Allows flue-cured lease and transfer of quota
1965	Public Law 89-12	Adopts acreage-poundage marketing quotas for flue-cured
1971	Public Law 92-10	Changes burley marketing quotas from acreage to poundage, and authorizes lease and transfer of burley quota
1982	No-Net-Cost Tobacco Program Act of 1982/Agriculture and Food Act of 1981	Begins assessments, and allows flue-cured quota sales separate from farms
1983	Dairy and Tobacco Adjustment Act of 1983	Abolishes flue-cured quota lease and transfer beginning in 1987
1985	Omnibus Budget Reconciliation Act of 1985/Tobacco Program Improvement Act of 1985	Changes formulas for establishing market price and quota level for burley and flue-cured
1990	Omnibus Budget Reconciliation Act of 1990	Expansion of 1985 legislation, adds additional marketing assessment
1990	Farm Poundage Quota Revisions Act of 1990	Allows burley quota sales separate from the land as long as the sale is within the same county
1993	Omnibus Budget Reconciliation Act of 1993	Penalties apply to cigarettes manufactured in the U.S. with less than 75 percent domestic content
1995	General Agreement on Tariffs and Trade	Replacement of domestic content rule with a tariff rate quota on imported tobacco; gradual reduction in tariff levels in future years expected

II.2.2 Quota Transfer Restrictions

An important component of the program, the means to transfer quota rights, has undergone a number of significant legislative changes throughout the history of the program. One constant in regard to quota rights transfer remains: quota rights must stay in the county of their origin. The only exception is the burley program in Tennessee, which allows lease and transfer of quota across counties within the state. In a recent state-wide referendum (December, 1991), Virginia producers rejected legislation that would have allowed lease and transfer of burley quota across county borders.

For Virginia tobacco producers, changes to the tobacco program quota transfer restrictions could create unique problems. The within-county transfer restrictions have prevented movement of participating tobacco classes to new areas of production since the inception of the program in the 1930s. What had been an on-going southeasterly shift of flue-cured tobacco production halted at that time. Some current production areas in Virginia may have higher production costs than other areas. If so, production in these locations could be jeopardized if quota transfer restrictions are lifted.

II.2.3 Quota Establishment

Annual marketing quotas for each participating class of tobacco are announced by the USDA. By law, the quotas are based on an estimate of the supply needed by manufacturers. A combination of intended purchases provided by cigarette manufacturers plus tobacco exports estimated from the prior three years' average exports, adjusted by quantities required to maintain reserve stocks at specified levels, generates the supply estimate. The Secretary of Agriculture can alter the estimate at his discretion. The resulting basic quota becomes an effective quota after adjusting for marketings under or over quota for the prior year. Producers are allowed the latter adjustment to accommodate a range of seasonable variability in production quantities.

The preliminary figures for the effective marketing quotas for 1996 are 944 million pounds for flue-cured and 724 million pounds for burley. Virginia's share is approximately 80.2 and 31.8 million pounds (Consolidated Farm Service Agency). Figure 2.1 provides a history of the effective national marketing quotas since 1980, with preliminary levels for 1996.

II.2.4 Mechanics of Price Supports

Growers of the participating classes of tobacco that adhere to the marketing quotas are eligible for price supports. Prices are established for various types and grades of tobacco

before the production year. After harvest, tobacco is taken to tobacco warehouses where it is graded and then sold by auction. If cigarette manufacturers are not willing to bid an amount higher than the support price, the tobacco goes under loan. That is, producer-owned cooperatives "purchase" the tobacco at the support price, store it, and attempt to avoid losses by selling it at a higher price in the future. The USDA's Commodity Credit Corporation lends the purchasing funds needed at current U.S. Treasury borrowing costs (Grise, 1995, p. 12).

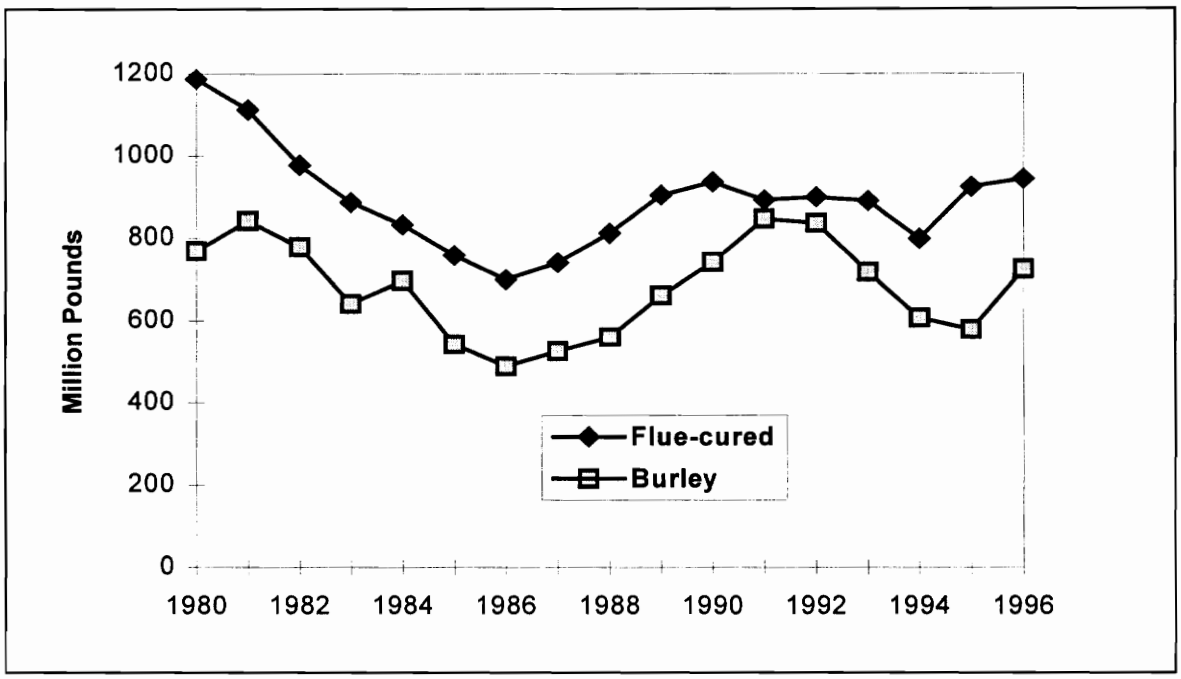


Figure 2.1 Effective Quotas Since 1980 for Burley and Flue-cured Tobacco

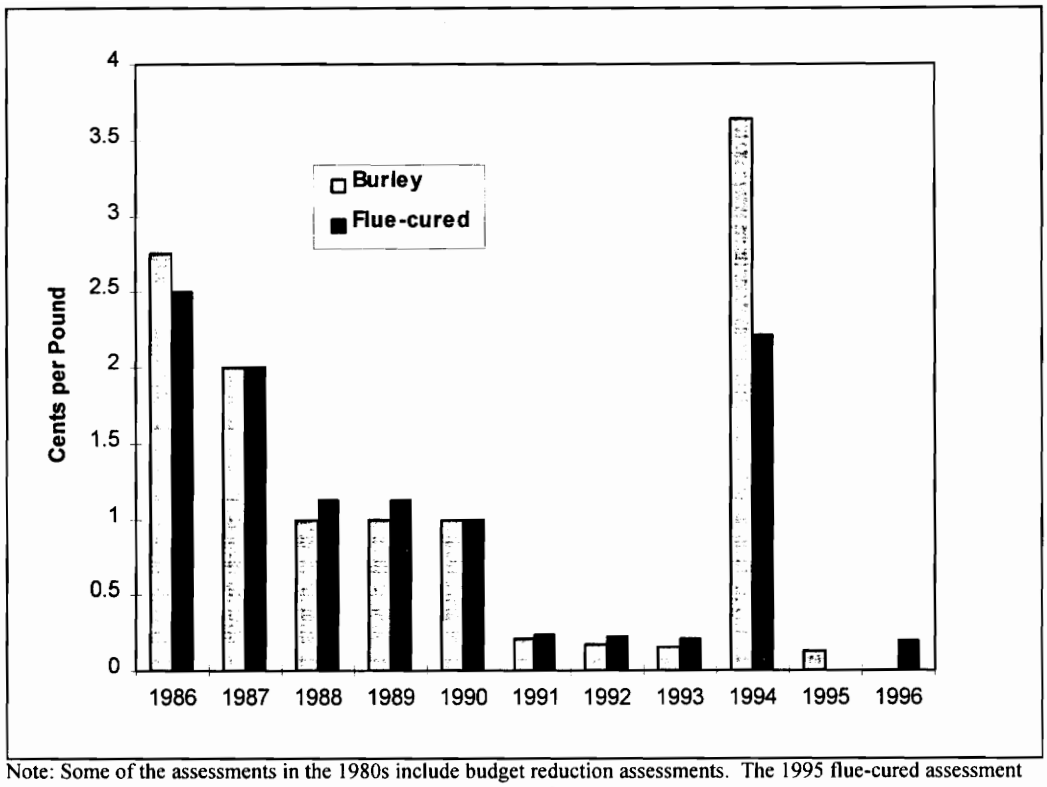
The support price calculation has changed over time. In 1996, the support price adjusts the 1995 price based upon the change in the five-year moving average of prices and the change in the cost of production index. To establish the final support price, the Secretary of Agriculture can adopt from 65 to 100 percent of the formula-calculated change. In 1996, the Secretary opted for 67 percent of the calculated change in determining the flue-cured support price (U.S. Department of Agriculture, December 1995, p. 3).

For 1995, the average support price is $1.597 per pound for flue-cured and $1.725 per pound for burley. The 1996 support prices are slightly higher, at $1.601 and $1.737. Loan rates for the individual grades of tobacco (which are based on quality, color, leaf length, and leaf positioning on the stalk) are established so that their weighted average is equal to the base support price.

II.2.5 No-Net-Cost Assessments

In the 1980s, the government made changes to reduce its expenditures on the program. Previously, cooperative losses on sales during periods of falling prices were paid by the government. The No-Net-Cost Tobacco Program Act of 1982 requires producers to pay for the losses through per-pound assessments which are paid into a fund established for this purpose. Any profits from cooperative sales are also placed in the fund. Subsequent legislation requires purchasers of tobacco to pay an assessment into this fund, including assessments on purchases of imported tobacco. The amount of the assessment varies with the quantity of tobacco under loan and with estimates of funds required to cover carrying costs and losses.

Instability in the no-net-cost assessment has plagued tobacco producers (see Figure 2.2). In 1994, this assessment exceeded previous years at 3.643 cents per pound for burley and 2.2085 cents per pound for flue-cured. Increasing levels of loan stocks contributed to the need for a higher no-net-cost assessment in 1994. The assessment fell substantially in 1995 to 0.1375 and 0.0015 cents per pound for burley and flue-cured, respectively. The 1996 flue-cured assessment rose to 0.1995 cents per pound. The burley assessment is still pending announcement as of June 14, 1996.



Note: Some of the assessments in the 1980s include budget reduction assessments. The 1995 flue-cured assessment is $.0015. The 1996 burley assessment is not announced as of June 14, 1996.

Figure 2.2 Producer No-Net-Cost Assessments Since 1986 for Burley and Flue-cured Tobacco, Marketing Assessments Excluded

In addition to the no-net-cost assessment, a marketing assessment of one percent of the support price has been levied since 1991. This assessment is divided equally between the producers and purchasers of tobacco.

II.2.6 Remaining Government Expenditures

Changes made to the tobacco program in the 1980s were partly in response to criticisms by various health groups of Federal government financial support of the tobacco industry. Currently, the no-net-cost and marketing assessments cover most of the costs of the program, leaving the government with administrative costs of $15 to $18 million per year (Grise, 1995, p. 12). In 1993, total government expenditures for program administrative costs plus research and other efforts are approximately $46 million (U.S. Department of Agriculture, June, 1994). Criticism of such government expenditures continues.

II.2.7 Manufacturers' Buyout

Current questions about the tobacco program center on the establishment of the quota and price support levels. The 1994 burley and flue-cured quota levels are the lowest since 1988. Many tobacco growers feared this trend would continue in 1995. However, an agreement reached at the end of 1994 between the manufacturers and producer cooperatives, with assistance from members of Congress, brought some improvement in quota levels and program stability. Manufacturers agreed to purchase the 1990-1993 loan stocks over the next seven years. Terms of the buy-out agreement allow the purchase of the tobacco at a discount, with the discounts covered by no-net-cost funds. This agreement reduces the excess loan stocks levels that have a depressing effect on the quota calculation. As a result, the 1995 effective quota level for flue-cured exceeded the 1994 level. The effective quota for burley declined slightly, because the basic quota increase did not cover the prior year's over-marketings. The buyout had a profound effect on the no-net-cost assessments: they dropped substantially for both burley and flue-cured tobacco in 1995.

Another important part of this agreement is the announced purchase intentions of the manufacturers for the next six years. Manufacturers are encouraged to purchase at least 90 percent of these intentions (adjusted annually for some agreed upon factors), because they will then be eligible for additional discounts on the purchase of the loan stocks. At the time, the announced intentions and incentive program were thought to bring stability to the program. Nevertheless, manufacturers' buying intentions for flue-cured tobacco did decline in 1996, by 17 percent from the prior year. The basic quota also fell in 1996 for flue-cured, but this is more than offset by under-marketings the prior year due to a smaller than expected harvest. Thus, the flue-cured effective quota grew by two percent from the prior year (U.S. Department of Agriculture). Burley fared much better with a 25 percent increase in the effective quota which builds on a 15 percent increase in the

basic quota. The buyout agreement may still have a stabilizing effect on quota levels, but this depends on the absence of large shocks to the tobacco markets.

II.2.8 The 1995 Farm Bill

Debate on the '1995 Farm Bill' out-lived its name. Congress needed new farm legislation to replace the expiring Food, Agriculture, Conservation, and Trade Act of 1990. This legislation was expected in 1995, but was not signed into law by the President until April 4, 1996. The delay in the completion of the legislation was due to the extent of changes made to existing programs and other competing legislative demands in Congress. Some discussion about the tobacco program entered into early debate on the Farm Bill, but the final legislation did not include any provisions or changes for tobacco. The tobacco program exists under separate continuing legislation from 1938 and 1949. Now that the overall farm legislation is passed, it is possible that the tobacco program will be brought up under new legislative agendas driven by any number of impetuses. One impetus for change to the tobacco program in future legislation could be various demand factors.

II.3 Factors Influencing the Tobacco Program

Programs and policies for tobacco will increasingly be forced to consider a volatile demand for tobacco and tobacco products. Price support policies will inevitably be in conflict with the marketplace if demand for tobacco declines significantly.

II.3.1 Health-Related Concerns

Linkage of cigarette smoking to health concerns has been a public issue for quite some time, the initial impetus being a Surgeon General's report in 1964. Such concerns have encouraged many smokers to quit or to reduce their consumption, while encouraging other potential smokers not to start. Domestic consumption of tobacco has experienced a long-term decline. Cigarettes, the most significant use of tobacco, leads the decline in consumption (Figure 2.3). Total consumption did increase very slightly in 1995, but per

capita consumption fell. Both measures are expected to fall in 1996 (U.S. Department of Agriculture, April, 1996). Fortunately for the cigarette industry, exports have increased such that United States output of cigarettes reached an all-time high (Figure 2.3). Some experts believe that the export market will eventually see a similar downturn in consumption due to health concerns.

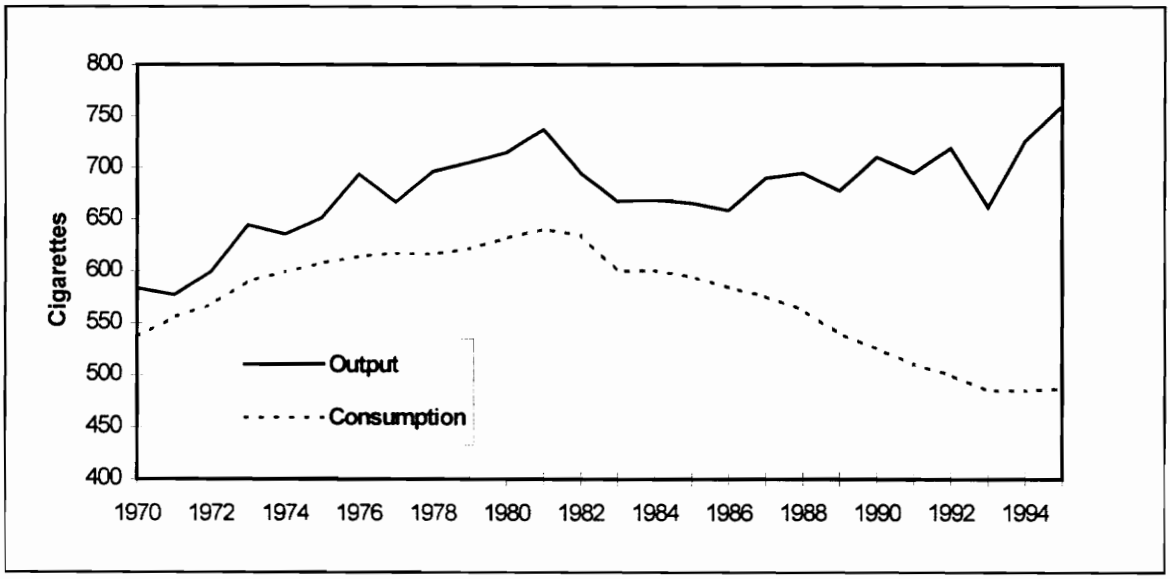


Figure 2.3 United States Cigarette Output and Consumption Since 1970

Partially driving lower consumption are attitudes and legislation that make it more difficult to smoke freely everywhere, partly due to worries about second-hand smoke. Smoking regulations for the workplace are being considered by the U.S. Department of Labor. Regulations would require employers to either provide separate adequately ventilated smoking areas or prohibit smoking. Many state and local governments have enacted or are considering smoking restriction legislation, while others are expanding existing regulations.

Another cause of health concerns are reports alleging that nicotine levels ingested while smoking some cigarettes can lead to addiction to nicotine and cigarettes. The previous

Congress held highly visible committee hearings in the House of Representatives that included testimony by executives of the largest companies in the tobacco industry. These executives testified that they are unaware of any attempts by their companies to manipulate the nicotine content of cigarettes. This contentious issue has recently resurfaced with new disclosures about alleged industry knowledge of the nicotine issue. Furthermore, one cigarette company recently settled a lawsuit, without admitting guilt, that dealt with this issue of nicotine manipulation in order to keep smokers hooked. This settlement in March, 1996, by the Liggett Group, the nation's fifth largest cigarette manufacturer, along with another subsequent settlement of a different lawsuit, are perceived as precedent-setting agreements. It is likely that the number and intensity of lawsuits will increase.

Prior to these recent settlements, the Food and Drug Administration (FDA) declared nicotine a drug in August, 1995. By doing so, the FDA can propose regulations on tobacco products, such as cigarettes, now considered "drug-delivery devices" (Lambert, p. B6). The President instructed the FDA to propose regulations that are intended to curtail smoking by minors. Accordingly, numerous advertising and distribution regulations have been proposed. Many industry observers believe that the FDA actions could have an impact on the tobacco industry beyond the proposed regulations. In addition to opening up the possibility of stronger regulations in the future, these actions are also likely to increase the intensity of legal actions against the tobacco industry. New and pending legal suits against manufacturers of tobacco products could have profound effects on the industry.

II.3.2 Tax Issues

With a 4 cent per pack increase on January 1, 1993, the U.S. Federal cigarette excise tax currently stands at 24 cents per pack of 20. The excise tax of 8 cents per pack in 1951

after adjusting for inflation would have been 42 cents per pack in 1993 (Grossman, p. 212). Some parties use this 42 cent estimate to support a higher excise tax.

During 1994, a number of legislative proposals for significant increases in the tax rate were proposed. These proposed tax increases would provide part of the funding required for proposed federal health care plans. Excise taxes above $2.00 per pack were discussed, but as the various plans developed, the tax tended to range from 45 cents to $1.00, often with phase-in periods of several years. According to one estimate, an optimal revenue raising excise tax would be $1.26 per pack (Grossman, p. 214). Total revenue from an excise tax would decline at rates above $1.26 due to larger offsetting declines in consumption. The current Congress has not eliminated consideration of higher tobacco excise taxes to pay for new health care legislation, but such legislation has not been a priority and may not see action before the next election. It is also possible in the future that opponents of the tobacco industry may urge Congress to increase the excise tax in order to encourage reduced consumption rather than strictly for its tax-raising merits.

Aggressive taxes on cigarettes are not only in the realm of the Federal government. For example, on July 1, 1995, the state of Washington raised its tax by 25 cents to 81.5 cents per pack (U.S. Department of Agriculture, June, 1995). Four other states also raised their cigarette taxes in 1995. While the state of Washington now has the highest state tax on cigarettes, the Commonwealth of Virginia retains the lowest state tax at 2.5 cents per pack. According to the U.S. Department of Agriculture, the weighted average of state taxes on cigarettes is 31.4 cents per pack as of December, 1995 (April, 1996, p. 5).

A substantial increase in the excise tax will reduce cigarette consumption. However, estimates of the response to an increase in price vary. Demand for cigarettes is less price sensitive (more inelastic) than many other commodities, but large price increases could

reach levels with greater price sensitivity (more elastic). Excise tax increases in the ranges discussed are larger than any previous increases, making estimation difficult. One forecast prepared for Congress states that a 75 cent increase in the tax will cause cigarette consumption to fall by over 15 percent (Womach, p. 4). Other industry observers predict that excise tax increases currently being discussed could reduce domestic consumption by one-third (Grise, 1993, p. 2).

II.3.3 General Agreement on Tariffs and Trade

Congress ratified the Uruguay Round agreement of the General Agreement on Tariffs and Trade (GATT) in December of 1994. Conforming with the general principles of GATT will lead to changes in tobacco market competition. In general, GATT works to encourage world trade. Reducing protection of domestic markets from imports provides one means to do this. Usually the process converts non-tariff import barriers into tariffs, with subsequent reduction of these tariffs over time.

For U.S. tobacco producers, equitable GATT implementation should impact both exports and imports. It will help encourage exports of tobacco as barriers in other countries are lowered. GATT-related activity has already taken steps that will impact imports. A short-lived domestic content restriction, which effectively prevented domestically produced cigarettes from containing more than 25 percent imported tobaccos, was not compliant with the GATT. A Presidential proclamation of a Tariff Rate Quota in September, 1995, replaced the domestic content restrictions by converting them into tariffs that are perceived as less stringent (U.S. Department of Agriculture, December, 1995, p. 5). These actions concern many in the industry. One economist suggests that tobacco imports will rise under the Tariff Rate Quota, possibly leading to a decline in domestic use of U.S. production (Bickers, p. 28).

Provided future GATT negotiations are effective, the fact that these tariffs will be reduced over time should cause the tobacco industry further concern. Given continued reduction of tariff levels over time, it becomes likely that the present U.S. support prices will be jeopardized. Without a decrease in the support price, lower-priced imports will cause more domestic production to go under loan. In such a scenario, the no-net-cost assessments supporting the loan prices will become prohibitive. Eventually, the price support arm of the tobacco program will have to undergo significant revision or face erosion of price support levels from increased world trade competitiveness under GATT.

II.3.4 Export Situation and Prices

GATT may provide the additional impetus needed for changes to the formula for determining the tobacco program support prices. Some analysts argue that the support prices are once again too high, thereby discouraging exports. The program has undergone changes in the past in answer to similar charges. For example, the significant formula change in the 1980s was partly in response to competitiveness issues. Given the current formula for determining quota production levels, producers seeking to maintain or increase quota levels look to increased exports in the face of declining domestic consumption. The current support price levels are an issue when increases in exports are needed to maintain production levels.

While an increasing share of tobacco production goes to exports, the U.S.'s total share of the world export market is declining. Despite reduced export competitiveness resulting from higher prices, U.S. producers have offset losses somewhat due to both an increased preference for blends that include high quality U.S. tobacco and higher foreign incomes for purchasing tobacco and tobacco products. The calculation of the 1994 flue-cured quota illustrates the importance of exports to U.S. production: the export contribution is greater than domestic purchase intentions. Although 1994 had an unusually low level of domestic purchase intentions, export significance cannot be downplayed.

II.4 Conclusion

Tobacco producers faced extreme negative external pressures in 1994, only to find mostly improved conditions for 1995. Better conditions also appear to be the case for the current year. Conditions improved in 1995 largely as a result of an agreement with manufacturers that increases domestic buying intentions and provides terms for the buyout of excess loan stocks. The increase in domestic buying intentions should be viewed as a one-time occurrence, rather than an increase that will be sustained. Quotas are expected to be fairly stable or declining over the next few years.

The entire tobacco industry was relieved that the federal excise tax for cigarettes did not increase in 1994 as feared, but that possibility remains for the future. Currently, the pressure on the industry is from lawsuits and regulations. Given these and many other issues facing the industry, changes to the tobacco program are highly likely. Tobacco producers have heard pessimistic warnings in the past, without the forecasted consequences coming true. The number of potential issues that are present at this time raises the stakes. Current trends increase the likelihood that, over time, one or more of these issues will come to bear.

II.4.1 Impact of Issues on the Tobacco Industry

Not all changes will impact everyone equally. Many of the possible sources of change would impact suppliers, manufacturers and producers negatively. Health concerns and their related restrictions, excise tax increases, and stronger foreign competition each impact the entire industry negatively by reducing demand, consumption and prices. Any of these reductions, lower tariffs over time with GATT, or pressures to reduce government support for tobacco, increase the chance that the tobacco program will be changed. Changes to the tobacco program may impact producers differently than manufacturers. In the extreme case, absence of the program could hurt some producers by lowering tobacco prices still further.

Regions can also be impacted differently. For example, tobacco production could shift to other areas, changing the regional economies. This can only happen with a change to the tobacco program. Restrictions on absentee quota owners have been under recent discussion for another commodity and remain an issue for tobacco. It is possible that empowering legislation for the tobacco program will be discussed and changed in future legislative activities of the Congress and that they could address absentee quota owners.

Many changes to the tobacco program have been advocated. Increasing the price competitiveness of tobacco in the world market suggests changes in the price support program. Some industry experts are advocating different forms of a two-tiered price system. One of these is an "export-rebate" type where the price of export tobacco is reduced by specially collected assessments. Another segregates tobacco grown for export into a separate system, resulting in two quota levels and two support-price levels (Tarczy, p. 4).

There has also been discussion of elimination of the program altogether. Concerns about the regional impact of such a change have encouraged a number of suggestions for reducing the impact. One suggestion is a buy-out of the quota program (Womach, p. 10). While this compensates quota owners, it does not compensate the locality for the changes that could occur.

Sumner and Alston (1985) estimated that, in the absence of any tobacco program, the price level of tobacco would fall by approximately 25 percent (p. 19). Such a price decline could lead to a 50 percent increase in tobacco sales (p. 27), lead by a doubling of exports (p. 26). Under this scenario, tobacco sales revenues would increase, but that does not necessarily translate into higher profits for producers. Thus, individual producers may not be better off.

II.4.2 Future Considerations

It is unlikely that the tobacco program will be eliminated unless large shocks to the industry, such as substantial federal excise tax increases, create the need. In the near term, continual moderate changes to the program similar to those faced by the industry in the 1980s and 1990s are likely. Changes to the program and a decline in the general conditions for the tobacco industry could negatively impact tobacco-producing regions in the Commonwealth. The next chapter looks at defining those regions that may be impacted the most.

Chapter III

Choice of Region

III.1 Introduction

Choice of region, or regional definition, is an important starting point for any regional study. For purposes of this study, the Virginia counties of Brunswick, Charlotte, Halifax, Lunenburg, Mecklenburg, and Pittsylvania define the *study region*. This region also encompasses the independent cities of Danville and South Boston. Figure 3.1 juxtaposes the *study region* with the Commonwealth of Virginia and the State of North Carolina. The purpose of this chapter is to provide the rationale for this choice of regional definition.

III.2 What Constitutes a Region?

The heading to this section raises a timeless question. Any student of history will realize the ebb and flow of political boundaries, one definition of region. Economists have also debated the question of regional definition for some time. The *Journal of Political Economy* captures a rather famous debate 40 years ago, between Charles M. Tiebout

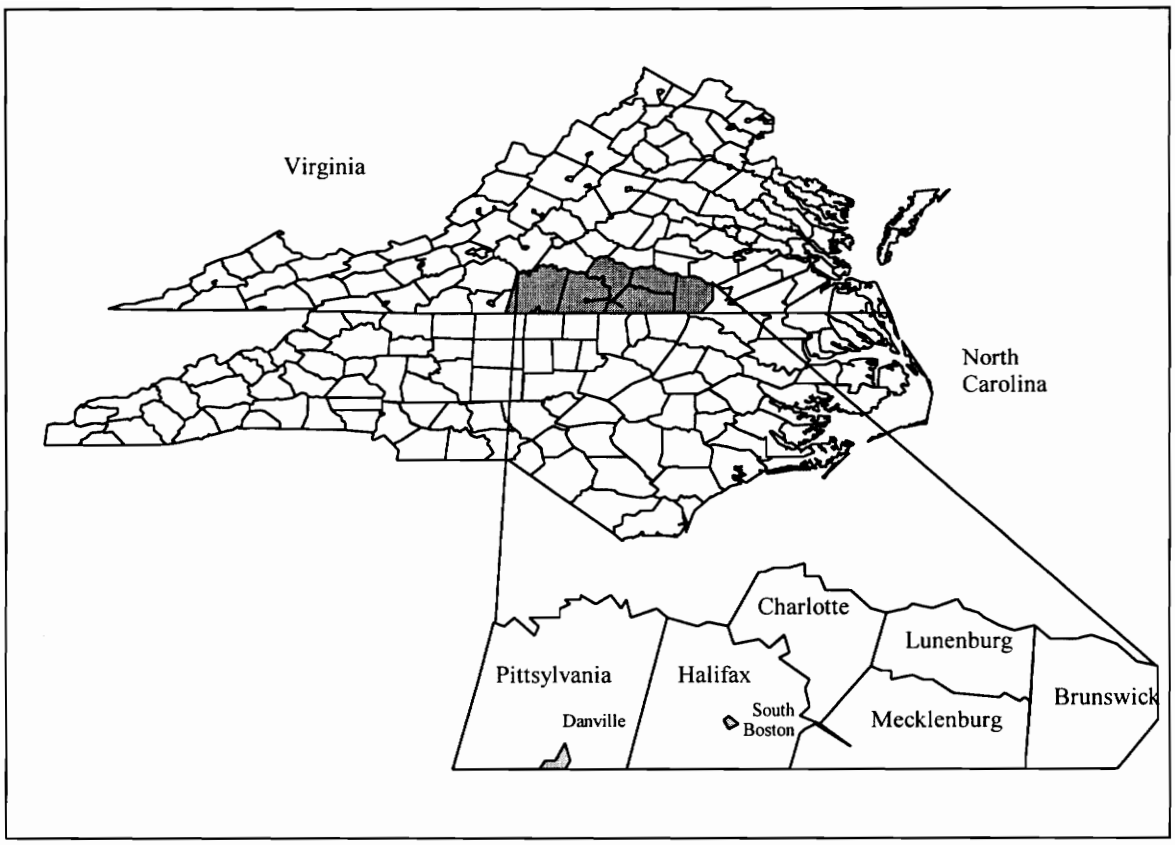


Figure 3.1 Southside Virginia

and Douglass C. North, about certain aspects of the importance of regional definition. Another oft-quoted article that same year on the concept of region is written by Walter Isard. All three prominent authors agreed that there is no "ideal region" (Tiebout, p. 161; North, 1956, p. 165; Isard, 1956, p. 26). Isard hoped an ideal way to define regions would develop over time, but his text, written 20 years later, remains only hopeful (Isard, 1975, p. 12). Skipping forward yet another 20 years still does not clear the picture: regional definition will continue to vary depending on purpose.

North sparked the debate about regional definition with his article "Location Theory and Regional Economic Growth", published in 1955. He suggests that the most important element, at least for economists' purposes, is the *export base*, because it provides an

economic common bond for the region (North, 1955, p. 257). Growth in a region is dependent on this export base, or ability to find a few key products to market abroad (p. 245). With a successful export base, a region will begin to grow and develop supportive secondary and internal consumption-oriented *residentiary* industries supported by income from exports (p. 253). In the most successful regions, investment of income in other industries will eventually lead to a diversified regional economy causing the region to lose its regional definition based upon the export base (p. 258).

Tiebout begins his assault on North's export base regional definition by pointing out that it does not address the importance of size to a region. In general, he argues that the larger the region, the less important exports will be to income and growth, because of greater internal trade (Tiebout, pp. 161-162). Tiebout thus suggests that regional boundaries be based upon the variables to be studied, or at the least, the influence that these boundaries have on the variables being weighed should be recognized (p. 162). He does not totally discount the importance of exports to growth, but he sees the necessity of finding a regional balance that includes supportive secondary and residentiary industries. Otherwise, the factor costs associated with exports will not be competitive (pp. 163-164). This perhaps contrasts with North's emphasis on "locational advantage" in determining how all but "footloose" industries are developed (North, 1955, p. 253).

North's reply indicates that some of the disagreement may be due to differences in the period of time they are talking about, Tiebout exposing the short-run, as opposed to North's long-run (North, 1956, p. 165). Time period differences aside, Tiebout's argument has been interpreted as a call for focus on "diversity and flexibility" in determining growth (Siegel, p. 166). North offers a contrasting view that a region will become more dependent on the export base as it grows and specializes around it (North, 1955, p. 248). In his reply he notes:

> *The usefulness of a region as an economic unit of analysis rests upon its specialization. It is this geographic division of labor, with different areas having*

> *special factor endowments and transfer costs, which makes the concept of the region valuable in economic analysis. The region's significance lies in its being a specialized part of the whole. If the size of the region is to be limited by its individual economic characteristics, then the concept of a geographically contiguous area held together by its development around a common export base is a useful (though certainly not the only) basis of classification. It has the added advantage that, in terms of the long-run growth of different areas in America, the export base has been influential in shaping a good deal of the history of the region (North, 1956, p. 165-166).*

The issues in the North and Tiebout debate are still relevant today and are critical in interpreting the results of this study's analysis.

While North and Tiebout are carrying on their debate, Isard is trying to go beyond "the controversial issues on the concept of region" and strengthen regional analysis (1956, p. 22). To do this he advocates examination of the structure of a region by using sectors as the unit of analysis. As such, Isard is an early proponent of input-output analysis, a technique that has matured in the subsequent 40 years (1956, p. 23).

III.2.1 The Role of "Linkages"

Input-output analysis frequently uses industries as the basis of sectoral aggregation and evaluation. There are two aspects of an industry or sector's contribution to a region: *backward linkages* and *forward linkages*. Backward linkages refer to the inputs required by the industry for the production of the industry's output or commodity. Suppliers of these inputs are referred to as backward-linked industries. Households that supply labor are also backward-linked, although they are not commonly considered industries. An industry evaluates its forward linkages by considering to whom it sells its output. These sales may be to consumers. However, some sales may be to forward-linked industries. These industries will perform further processing on the commodity, thereby adding value to it and possibly changing its next intended use. Input-output can effectively estimate an

industry's backward-linkages, while forward-linkages are not easily measured (Johnson, Wade and Archambault, p. 18).

III.2.2 The Role of "Leakages"

Not all linkages will be exercised within the region being studied. That is, some of the backward linkage inputs may be purchased outside the region being studied. Similarly, forward linkage sales may be outside the region. While all of these forward linkages are exports, if some of the products sold undergo additional processing, then there may be a lost opportunity for the region to provide this service. The term *leakages*, introduced previously, refers to the size of the losses of both of these linkages to areas outside the region of study. However, it is most commonly applied to backward linkage leakages. It should be noted that the size of these leakages does depend on the size of the region being studied, an aspect of the North and Tiebout debate. In the next section these linkages for the tobacco industry will be evaluated.

III.3 Influence of Geography on a Region

Definitions of region can also evolve over time for social and cultural reasons. Some of these develop due to geographical restraints or other bases that bind an area of people together into a cohesive group. Similarly, geographical features can influence the location and size of population centers by providing a competitive advantage, or North's locational advantage. Frederick F. Siegel (1987) has written an interesting history about Danville and surrounding Pittsylvania County for the period 1780-1865. Siegel's book carries a number of themes on the region's development, often examining geographical determinants. One of these themes examines rivers, roads and railroads as a key to development.

Rivers, roads and railroads help spur development by providing transportation systems to market regional product with lower transaction costs. In the case of Danville and

Pittsylvania County, rivers and associated canals, roads, and railroads were introduced chronologically in opening up markets to the region. Noteworthy is the fact the Roanoke River was

> *Danville's only major connection to the east or west* in 1833, while *the chartering of the Richmond and Danville Railroad in 1847 was the single most important event in revitalizing* [Danville] (Siegel, p. 51 and p. 106).

The same river and railroad were also important sources of transportation for other parts of the *study region.* This rail line ran through Pittsylvania, Halifax, Charlotte and Lunenburg Counties (p. 108). Rivers were also important, because they could provide water power. Early Danville located grain mills on the Dan River, and, at a later date, the still significant textile mills of today.

While rivers were a natural advantage to the area, another of Siegel's themes dwells on a competitive disadvantage provided by nature. In his conclusion, he attributes the region's limited economic development to the fortunes imposed by nature (p. 166). One of these misfortunes is the poor productivity of the soil, something early settlers were to discover, because "the beauty of the land was to be only a kind of agricultural fool's gold" (p. 10). The climate only compounded problems further. In general, the sandy soils could not support the grass types needed for cattle, while the climate was not cold enough to provide the cleansing of parasites that benefited areas further north (pp. 70-71). Subsequent agricultural advances have removed many of these problems.

Although cattle and other agricultural products were at a disadvantage in the region, one product proved to be at advantage: bright leaf tobacco.

> *The sandy soils that retarded Pittsylvania's early development were the key to its later success as a producer of bright tobacco* (Siegel, p. 4).

Siegel traces the development of tobacco production in the area and the parallel development of tobacco manufacturing in Danville. Ultimately, Siegel sees the lack of

opportunity provided by the natural environment to cause a "structural dependence on tobacco", the only opportunity at hand (p. 5).

Keeping in mind the period of time Siegel is addressing, he noted that tobacco farming "required little in the way [of]... backward and forward linkages" (p. 66). Similarly, tobacco manufacturing had "few spread effects" (p. 129). However, tobacco manufacturing was important to Danville's economy, employing half of the work force in the late 1840s (p. 129). By 1860, 1,050 people were employed by tobacco manufacturing in Danville (p. 105). Siegel suggests that

> *in the 1880s the profits from tobacco marketing and manufacturing went into the development of the massive textile mills that utilized the water power of the Dan River* (p. 162).

Unfortunately, such diversification did not similarly occur in the tobacco-producing regions surrounding Danville, there being "only a limited range of intercourse between town and countryside" (p. 166) Thus, he sees "continuity, not transformation, [as] the core of a tobacco-based economy" (p. 163).

In his conclusion, Siegel reopens the North and Tiebout debate, and applies it to the dichotomy of Danville and the surrounding tobacco-producing region (pp. 165-166). While Siegel's historical approach sheds some interesting light on the North and Tiebout debate as it applies to early Danville and Pittsylvania County development, it could have benefited from some ideas advocated by Isard in the same year. There is no better way to measure linkages than with input-output analysis.

III.4 Regional Selection Criteria According to Input-Output Literature

Input-output literature and the broader regional science literature use a number of bases of regional definition, or *impact area delineation*. For input-output analysis, each problem being addressed will often require a different impact area definition. However, there is

one aspect that recurs in every definition: "the geographic extent of the daily activity field [for] the problem focus" (Siverts, Alward and Maki, p. 17). A common means of addressing this issue defines regions in terms of *functional economic areas*.

III.4.1 Functional Economic Areas

Karl Fox created the name "functional economic area" and is credited with much of the development of the definition (Prescott, p. 2). Boundaries for these areas are established with the objective of finding a "relatively self-contained" area with regard to most activities (Hoover, p. 281). Commuting and shopping distances, discussed in detail in latter sections of this chapter, are key aspects of this analysis that focuses on spatial behavior and a sustainable region-wide population[4].

Functional economic areas contrast with definitions of areas that focus on core population centers. An example of the latter, metropolitan statistical areas, will be examined in a later section. The application of Fox's ideas ultimately leads to an alternative to metropolitan statistical areas: the Bureau of Economic Analysis's (BEA) development of a breakdown of the United States into Economic Areas, discussed below (Fox, 1994a, p. 109).

Fox's work in this area started in the early 1960s. Prescott (1994) notes that Fox saw the importance of increased mobility brought about by automobiles and how this enlarged previously stable regions. In particular, this causes long-held political boundaries used for regional analysis to be less applicable (Prescott, p. 2). Nevertheless, political boundaries are still important, because development funds or policy changes often follow

[4]The functional economic area is also often discussed in conjunction with labor market analysis. It seems that in this regard neoclassical and radical economists are in agreement. Sheppard and Barnes, in *The Capitalist Space Economy*, provide a quantitative survey applying Marxist and Radical theory. They use the urban labor market as their unit of analysis in defining regions. Part of their argument for this definition is that labor is a less flexible component in the production process than capital and commodities (p. 57).

these units. As such, users of input-output analysis frequently have to follow the dictates of political boundaries in order to please their client or target audience. Common political boundaries are addressed below.

Prescott also notes that functional economic areas should be

> *similar in their composition of their service sectors*, but *the mix and level of export activity will vary*[5] (p. 2).

This raises the issue of export base, introduced earlier. The export base is a particularly suitable basis of definition for this study which focuses on tobacco. Tobacco production is restricted by statute to a relatively small region of the United States, and is thus a heavily exported commodity from that region. Furthermore, since input-output impact analysis relies on this theory with its emphasis on exogenous changes in demand, the export base is a primary consideration for this study.

III.4.2 Region Size

The size of a study region becomes an important consideration for those input-output analysts who choose not to follow BEA or other defined economic areas. In these cases definition of a region must be large enough that it becomes a functional economic unit. Such a unit may revolve around a central city, but it needs member industries and support services that allow for the area to provide for many of its needs. In other words, the analyst should consider trade patterns when setting the region size. One advantage of a larger region is that leakages are reduced; a larger region will normally require less imports to support its activities. Thus, employment, income and other measures of any activity's impact will be greater in the region.

[5]Fox notes that the "labor force requirements of each Functional Economic Area [could be summarized] by means of two vectors, one representing the occupational characteristics of the residentiary labor force and the other the characteristics of the export-oriented labor force" (1994b, p. 87).

Another advantage of a larger geographical region, particularly if a particular commodity is being analyzed, is that it reduces the amount of *cross-hauling*. Cross hauling is where a commodity is both imported and exported by a region. This situation is often not accounted for properly in input-output models. In the case of tobacco, it is difficult to eliminate cross-hauling unless all tobacco-producing areas are included in the regional definition. Consideration of situations of cross-hauling in tobacco stemming and redrying operations are discussed in more detail in Chapter V.

While care must be taken not to define a region that is too small, the region must not become so large that the impact being measured is overshadowed or diminished by other industries and the larger unaffected population, thus making it difficult to trace the impacts to the affected sectors (Siverts, Alward and Maki, p. 18). For this reason Richmond is not included in the final *study region*, despite the significant tobacco-related presence of cigarette manufacturing. The emphasis of this study is on a distinct tobacco-producing region that would be overshadowed by the larger Richmond area.

Some studies do not settle for one study area. A recent study that looks at the economic impact of the Wool Act has three study areas: a 40 county region of Texas, a ten county subset of that region, and finally an analysis of the individual county most dependent on wool production (Jones and Wyse). Care must be exercised in conducting such studies and comparing the regions. Furthermore, it is unlikely a single rural county comes close to approximating a functional economic area, and this increases the difficulty in measuring trade flows. Such small areas may not capture the full effects of backward linkages. That is why some practitioners advise as a general guideline "...a multicounty unit as the minimum geographical size..." (Henry and Johnson, p. 29).

III.4.3 Selection Criteria Summary

In summary, a particularly succinct synopsis of the factors involved in selecting a region for impact analysis is provided by Ecosystem Management (1992), a division of the Forest Service:

> The objective is *to define a study area that represents the question or concern of the manager or group requesting the analysis. In terms of size the area should be large enough to:*
>
> *1) include all relevant activities (forward and backward linkages) related to the question, and*
>
> *2) serve as a functional economic area,*
>
> *but the area should be small enough to:*
>
> *1) be geographically oriented to the question, and*
>
> *2) represent the individuals, institutions, and industries most affected by the proposed action (Ecosystem Management, section I. B.).*

In general, much of the literature is rather vague about regional definition. Ultimately the decision and its justification is left up to the analyst, provided the region is not already predetermined. It is thus appropriate to turn to the objectives of this study as a beginning point in evaluating these factors.

III.5 Influence of Study Objectives

Before the region can be defined, the objectives of the study must be clear. In this case, the study intends to examine several economic issues related to flue-cured tobacco production and tobacco stemming and redrying processing in the Commonwealth of Virginia. A point of departure, then, is to determine where these two activities take place in the Commonwealth and nearby regions.

III.5.1 Virginia Flue-cured Tobacco Production

Flue-cured production figures for 1993 were analyzed at the start of this study. A previous study mapped production for the Commonwealth with 1992 production estimates (Purcell, p. 7). By combining this information, a core region of six contiguous

counties was found to contribute heavily to total production. Table 3.1 provides the production statistics for these counties that form the basis of the *study region*.

Table 3.1 *Study Region* Tobacco Production Figures for 1993

County	Flue-cured Pounds	Fire-cured Pounds	Burley Pounds	Total Pounds
Brunswick	5,340,000	205,000		5,545,000
Charlotte	3,441,000	507,000	32,600	3,980,600
Halifax	12,817,000	160,000		12,977,000
Lunenburg	4,432,000	80,000		4,512,000
Mecklenburg	10,124,000	23,000		10,147,000
Pittsylvania	20,043,000	152,000		20,195,000
Total	56,197,000	1,127,000	32,600	57,356,600
Virginia	73,260,000	1,872,000	24,308,000	99,440,000
% of Virginia	76.7 %	60.2 %	0.1 %	57.7 %

Source: 1993 Virginia Agricultural Statistics, County Estimates, pp. 40-41.

Note: State production of 104,000 pounds of Sun-cured tobacco is not reported above. All of the counties have higher flue-cured production in 1994. Total Virginia flue-cured production in 1994 is 82,280,000 pounds.

As indicated by the table, flue-cured production in the *study region* is over 56 million pounds and accounts for almost 77 percent of the Commonwealth's total flue-cured production. Production of other types of tobacco, fire-cured and burley, exists in the *study region*, but it only accounts for approximately two percent of the total pounds of tobacco produced in the region. Given the relative insignificance of the other types, the focus for the *study region* will be flue-cured tobacco.

Production statistics for Virginia counties outside the *study region* with flue-cured production over one million pounds is provided in Table 3.2. Patrick County is the only county in Table 3.2 that is not a county bordering the *study region*. The 6 additional counties in this table account for approximately 18 percent of the Commonwealth's flue-cured production. When combined with the *study region*, only a little over five percent of flue-cured production is unaccounted for. Two border counties not listed in the table

have flue-cured production over 500,000 pounds for the period: Greensville County with 925,000 pounds and Prince Edward County with 600,000 pounds (1993 Virginia Agricultural Statistics, County Estimates, pp. 40-41). Figure 3.2 summarizes production information for Virginia and North Carolina.

Table 3.2 Virginia Counties Outside the *Study Region* with 1993 Flue-cured Production Over One Million Pounds

County	Flue-cured Pounds	Fire-cured Pounds	Burley Pounds	Total Pounds
Campbell	1,617,000	243,000		1,860,000
Dinwiddie	3,219,000	75,000		3,294,000
Franklin	3,224,000			3,224,000
Henry	1,716,000			1,716,000
Nottoway	1,189,000	71,000		1,260,000
Patrick	2,297,000			2,297,000
Total	13,262,000	389,000	0	13,651,000
% of State	18.1 %	20.8 %	0.0 %	13.7 %

Source: 1993 Virginia Agricultural Statistics, County Estimates, pp. 40-41.

Note: Sun-cured tobacco production is excluded from this table. Campbell, Dinwiddie and Franklin Counties have higher production in 1994, while Henry, Nottoway and Patrick Counties are lower.

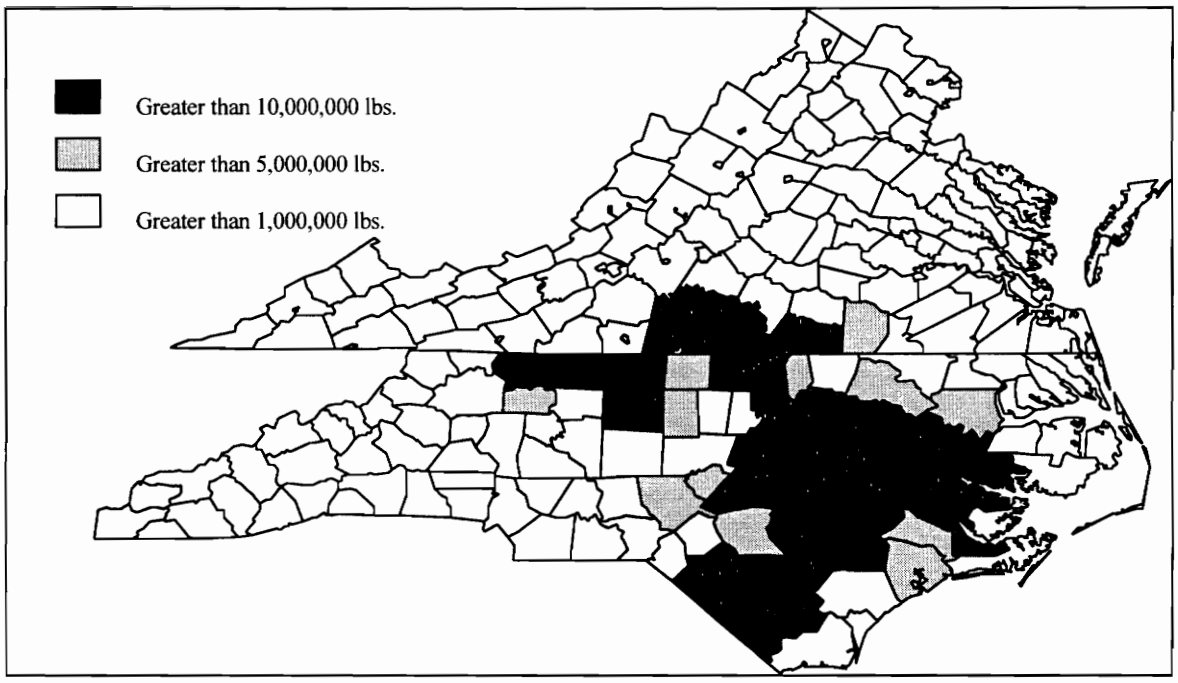


Figure 3.2 1993 Flue-cured Tobacco Production in Virginia and North Carolina by County

Production levels should not be the sole criteria used, however. County size, population, and the variety of means of earning income differ. Table 3.3 provides a crude measure of tobacco production's significance to a county by incorporating some of these concerns. It utilizes a descriptor that is a calculation of tobacco sales as a percentage of household income. Twelve tobacco-producing counties, including the six counties that compose the *study region*, generated a descriptor greater than two percent. Using the rankings from this measure, the *study region* encompasses those counties most dependent on tobacco production for household income.

Table 3.3 Virginia Counties Ranked by Tobacco Sales as a Percentage of Household Income

County	1992 Tobacco Sales ($ Thousands)	1989 Median Household Income ($)	1990 Total Households	Descriptor[1]	Rank
Brunswick	8,994	19,424	5,499	.0842	3
Charlotte	7,298	20,481	4,312	.0826	4
Dinwiddie	6,287	29,388	7,492	.0286	9
Halifax	24,878	22,296	10,728	.1040	1
Lee	5,518	14,618	9,231	.0409	7
Lunenburg	8,267	19,459	4,423	.0961	2
Mecklenburg	18,683	20,901	11,244	.0795	5
Nottoway	2,397	21,774	5,244	.0210	11
Pittsylvania	38,579	25,585	20,613	.0732	6
Russell	5,178	17,853	10,641	.0273	10
Scott	6,294	18,346	8,966	.0383	8
Washington	7,959	22,179	17,483	.0205	12

Source: U.S. Bureau of Census, 1992 Census of Agriculture, Table 12: Tobacco Sales; U.S. Bureau of Census, 1994 County and City Data Book, Table B. Counties: Household Income - Item 79, Total Households - Item 35.

[1]The descriptor is equal to the second column multiplied by 1000 and divided by the product of the third and fourth columns. Only counties with a descriptor greater than .02 are listed.

Only two counties in Table 3.3 are flue-cured producing counties outside of *the study region*: Dinwiddie and Nottoway. These counties are adjacent to Lunenburg and Brunswick Counties to the north-east, and are more proximate to Richmond. Thus, Dinwiddie and Nottoway Counties are more influenced by the greater Richmond-Petersburg area. If these counties are added to the *study region*, the Richmond influence may diminish tobacco's impact as described earlier. The other counties in the table are burley producing counties in southwest Virginia.

On the basis of both tobacco production and its significance to household income, the six counties of the *study region* certainly form a core area in Virginia. Whether additional

counties should be added to this core depends on additional considerations. Thus far, only Virginia counties have been analyzed. There are also tobacco-producing counties to the immediate south in North Carolina that should be considered in the analysis.

III.5.2 North Carolina Flue-cured Tobacco Production

Flue-cured tobacco production in North Carolina greatly exceeds production in Virginia. Table 3.4 provides the total flue-cured production for 1993 and 1994 in North Carolina, which can be compared to Virginia in Table 3.1. Note that the North Carolina total reflects three types of flue-cured tobacco grown in the state: Type 11, which is also grown in Virginia, and Types 12 and 13. These types reflect the different regions where the tobacco is grown in North Carolina. Individual county production figures are also provided in Table 3.4 for the eight counties that are adjacent to the *study region.* A later section considers their inclusion in a larger region of study.

Table 3.4 Flue-cured Tobacco Production in North Carolina Counties Adjacent to the *Study Region*

County	1993 Pounds	1994 Pounds
Rockingham	15,412,000	14,792,000
Caswell	9,746,000	11,133,000
Person	10,856,000	12,332,000
Granville	11,899,000	15,705,000
Vance	7,933,000	10,147,000
Warren	4,278,000	6,829,000
Northampton - Type 12	540,000	470,000
Halifax - Type 12	6,627,000	8,098,000
Total	67,291,000	79,506,000
North Carolina - Types 11, 12 and 13	587,895,000	582,285,000
% of State	11.4 %	13.7 %

Source: North Carolina Department of Agriculture, Agricultural Statistics Division, found on the Internet at: http://www.agr.state.nc.us/stats/cnty_est/CTYTOBYR.HTML.

Note: Halifax County is not immediately adjacent to Virginia, but is only separated by a finger of Northampton County that is only a few miles wide at its narrowest. Thus, more of Halifax falls immediately south of the *study region* than does Northampton County.

III.5.3 Tobacco Stemming and Redrying Processing

Tobacco stemming and redrying is an intermediate industrial processing stage, because it takes tobacco from the farm-gate and processes it for resale to cigarette manufacturers. Table 3.6 provides statistics on stemming and redrying at the national level. It indicates that there are 47 stemming and redrying establishments. A further breakdown of this total indicates that at least eight of these establishments are located in Virginia[6] (U.S. Bureau of the Census, 1992 Census of Manufactures, p. 21A-9). However, not all of these are flue-cured stemming and redrying operations.

A telephone conversation with an employee of the Flue-cured Tobacco Cooperative Stabilization Corporation was the starting point for determining the location and ownership of flue-cured tobacco stemming and redrying operations. Table 3.5 is the outcome of this conversation, improved by both cross-checking and adding information from annual reports and other industry publications.

The table provides detail on 12 flue-cured stemming and redrying operations. It also indicates an inconsistency with earlier material presented in Chapter I, which indicated that there are three stemming and redrying operators in Danville and Pittsylvania County, employing approximately 1,400 people. However, there have been some changes in the region since the time of publication of the directory providing these statistics, as indicated by the presence of only two Virginia operations in the table.

The largest stemming and drying operator in the region, Dibrell Brothers, merged with Monk-Austin of Farmville, North Carolina, to form DIMON, Inc. Stockholder approval in March, 1995, created the world's second-largest tobacco dealer, Universal Corporation remaining the largest (Gray; Greensboro News & Record; and Monk-Austin, Inc. 10-K/A

[6]Additional detail, similar to the statistics in Table 3.6, are mostly unavailable at the state level due to privacy laws preventing disclosure.

Table 3.5 Flue-cured Stemming and Redrying Plants

Key[1]	Location	"Operating" Name	Parent Company[2]
2	Danville, VA	Southern Processors, Inc.	Universal Corporation
1	Pittsylvania Co., VA	Dibrell Brothers, Incorporated (pre-merger)	DIMON Incorporated
3	Brook Cove, NC[3]	R. J. Reynolds Tobacco Company	RJR Nabisco, Inc.
9	Farmville, NC	Monk-Austin, Inc. (pre-merger)	DIMON Incorporated
10	Greenville, NC	Eastern Carolina Leaf Processing Company	50 % DIMON Inc. and 50 % Intabex-Hail & Cotton International Company
5	Henderson, NC	J.P. Taylor Company, Inc.	Universal Corporation
12	Kinston, NC	Monk-Austin, Inc. (pre-merger)	DIMON Incorporated
4	Oxford, NC	General Processors, Inc. (related to W.A. Adams Co.)	Standard Commercial Corporation
6	Rocky Mount, NC	Thorpe and Ricks, Inc.	Universal Corporation
11	Smithfield, NC	K.R. Edwards Leaf Tobacco Co., Inc.	Universal Corporation
7	Wilson, NC	Tobacco Processors, Inc.	Universal Corporation
8	Wilson, NC	Standard Commercial Tobacco Co., Inc.	Standard Commercial Corporation

Source: Outlined in a 11/20/95 discussion with Mr. Gary Harris. Strengthened by International Trade Publications Ltd.: World Tobacco Directory, 43rd Edition 1995, and various annual reports and SEC Form 10-K's of the parent companies.

[1] 'Key' refers to the number on the associated map - see Figure 3.3.

[2] 'Parent Company' refers to the final consolidated parent company. For example, rather than the Universal Corporation, its subsidiary, Universal Leaf Tobacco Company is the parent of some of these entities.

[3] Brook Cove is not a town per the last census. It is located near Walnut Cove in Stokes County North Carolina.

Note: Both Universal Corporation and Standard Commercial Corporation operate redrying facilities in Kentucky, but these locations do not process flue-cured tobacco.

p. I-1). Furthermore, one of the Danville stemming and redrying operations, Lorillard Tobacco Co., has reduced its operations to warehousing, having chosen to contract with

DIMON rather than conducting its own stemming and redrying (Gaulin; and Solomon).

These recent events in the region are a reflection of some of the adjustments and consolidation taking place in the industry as part of a long-term trend. According to one industry expert, while there are now only 12 flue-cured stemming and redrying plants, not so long ago there were 21 (Harris). The Standard Industrial Classification for Tobacco Stemming and Redrying, Industry 2141, is a broader definition that will include burley-only redrying operations and leaf merchants. Nevertheless, census figures for this industry also reflect this consolidation. In the 1987 Census, there are 62 companies with 76 establishments. This declined to 33 companies and 47 establishments in 1992[7] (U.S. Bureau of the Census, 1992 Census of Manufacturers, p. 21A-7). Part of the reason for the consolidation in the industry is a trend toward larger automated plants that began with the construction of the first "superplants" in the early 1960s (Duke, p. 90). One analyst suggests the DIMON consolidation can be attributed to economies of size, or larger capitalization, required to be competitive in the international arena (Waggoner). This is another reason for consolidation: increasing competitive pressures outside of the United States potentially creating smaller market shares.

The growing importance of tobacco supply and on-site stemming and redrying operations in countries outside of the United States is an indication of these increasing competitive pressures. Dibrell Brothers reports in 1994 that the U.S. tobacco program causes U.S. tobacco to be more expensive than most foreign-grown tobacco, which has contributed to an increase in importance in their overseas operations (Dibrell Brothers, Incorporated, p. 2). Executives of Dibrell Brothers and Monk-Austin cited the need to combine in order to reduce costs, particularly since a "worldwide surplus of tobacco and price wars among

[7]Of the 47 establishments, 14 have 9 or less employees and only 10 have 250 or more employees (U.S. Bureau of the Census, 1992 Census of Manufactures, p. 21A-12).

cigarette makers" are driving down the price that will be paid for processed tobacco (Gray).

Further adjustments for all stemming and redrying operators in the U.S. are possible, should there be a decline in U.S. production that contributes to a growing over-capacity in domestic operations. For example, after recent large capital investments, Dibrell Brothers' U.S. operations were only at 60 percent of capacity in 1994 (Dibrell Brothers, Incorporated, p. 3). This may have provided some impetus for the subsequent merger. Note, however, that industry merger and consolidation does not affect all regions equally. The closure of the Lorillard redrying operation in Danville did result in a loss of jobs[8]. But some of these jobs will have transferred to DIMON's plant across the street in Pittsylvania County, since DIMON has contracted to meet Lorillard's needs. This relocation likely absorbs some of the excess capacity mentioned by the Dibrell report. Similarly, the DIMON merger may result in further absorption of this extra capacity. Subsequent to the merger, a Monk-Austin redrying plant was closed in South Carolina (DIMON 1995 Annual Report, p. 3). The remaining domestic DIMON plants are likely to receive some allocation of the production formerly handled in South Carolina.

Because of the recent consolidation in the industry, any previous measurements of regional contribution from this industry are likely to be inaccurate. Furthermore, this consolidation is likely to have changed the supply pattern of tobacco inputs to stemming and redrying operations. As a result, the measurement of regional supply and leakages will have changed. This complicates a situation already made difficult by the presence of cross-hauling. One solution is to define a region covering all of the plants. Figure 3.3 provides a map of the locations of these plants, using Table 3.5 information. As the map indicates, the plants cover a fairly large area. Unfortunately, this area includes significant

[8]Lorillard announced that twenty-eight hourly and salaried employees will lose their jobs from the closure, with sixty-five employees remaining in the warehousing operation. Prior to its closure, the redrying operation was only operating on a one-shift basis (Solomon).

urban areas of North Carolina. As a result, their inclusion would result in a loss of some of the focus of the study. Keeping the focus of the study is also difficult because of other tobacco-related operations in the area. This is the subject of the next section.

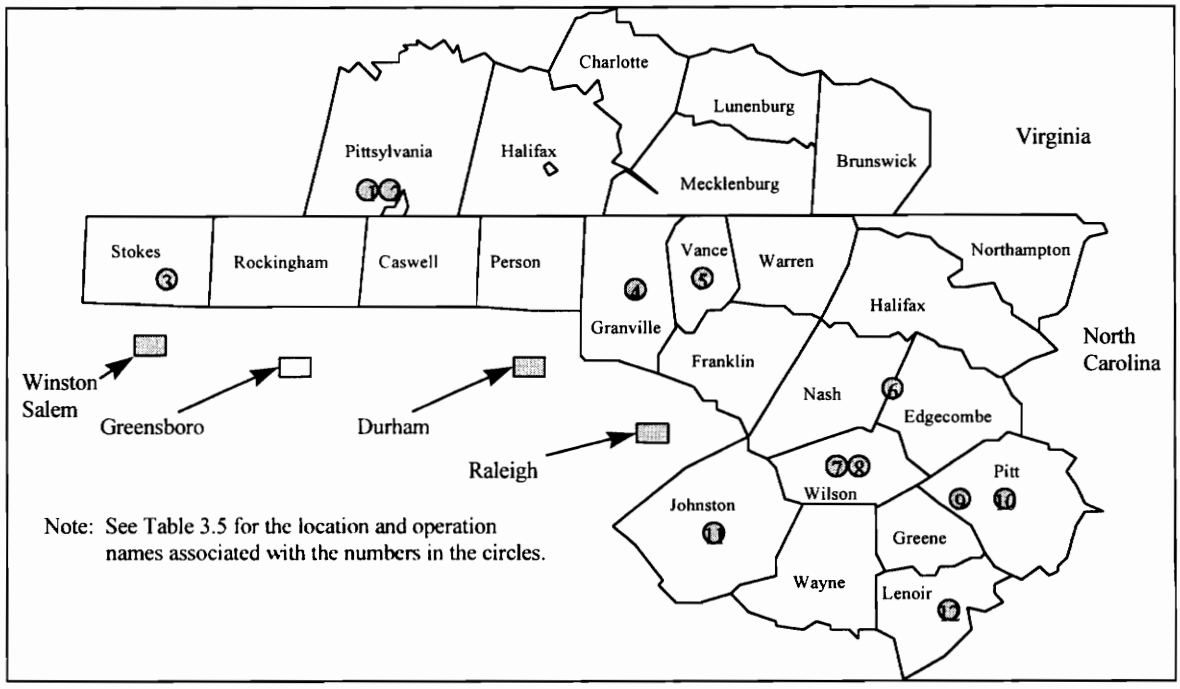


Figure 3.3 Location of Stemming and Redrying Operations in Virginia and North Carolina

III.5.4 Other Virginia Tobacco-related Operations

So far, only flue-cured tobacco production and stemming and redrying operations have been analyzed. Any discussion of tobacco-related operations would be remiss in not mentioning the largest end use of the product: cigarettes. In fact, cigarette manufacturing is the largest of the tobacco manufacturing industries by most common measures. Table 3.6 gives selected 1992 statistics for different tobacco manufacturing industries. Factors such as value added, value of shipments, and number of employees show cigarette manufacturing's dominance of the tobacco manufacturing industry. However, relative to

the value of product shipments, the tobacco stemming and redrying industry is more capital and labor intensive than cigarette manufacturing.

Table 3.6 U.S. Tobacco Manufacturing Statistics for 1992

Industry	Estab-lishments 1992	Value Added ($ Millions)	Value of Shipment ($ Millions)	Depreciable Assets End of Year ($ Millions)	Total of All Employees
Cigarettes	11	24,801.9	29,746.1	5,254.7	25,400
Cigars	27	190.1	286.8	59.9	2,600
Chewing and Smoking Tobacco	30	1,212.5	1,608.4	218.4	3,200
Tobacco Stemming and Redrying	47	1,002.3	3,557.1	1,099.9	6,800

Source: Bureau of the Census, 1992 Census of Manufacturers, pp. 21A-7, 21A-10.

The company with the largest share of the U.S. cigarette market, Philip Morris, is well known to most Virginians for its presence in Richmond, where it carries on manufacturing operations. In fact, "Philip Morris USA is the biggest private employer in Richmond" with approximately 8,000 employees, and its area plant is the largest cigarette factory in the United States (Ress). Unfortunately, even the industry leader is not without its employment cuts, with a decrease of nearly 1,000 area workers in 1994 (Jones, 4/25/95). These are not the only tobacco-related job losses the Richmond area has felt. In the 1980s there were two different cigarette production operation closures by American Tobacco Company, leaving Philip Morris as the area's sole cigarette manufacturer (Jones, 2/20/95). Additionally, Brown and Williamson once had a large Petersburg operation (Jones, 12/24/94). This list of closings becomes longer as the historical time period of evaluation is lengthened.

Cigarette manufacturing is not the only Virginia tobacco industry hit by closures. Most recently, the purchase of American Tobacco by B.A.T. Industries PLC has lead to further closures in the Richmond area. Approximately 350 employees in Richmond and Chesterfield County lost their jobs in January, 1995. Many of these were in research and administrative positions that duplicated B.A.T.'s Brown and Williamson Tobacco Company operations in Louisville, Kentucky. All that remains of American Tobacco's operations in the area is a reconstituted leaf plant in Chesterfield County that employs approximately 145 people, and a South Richmond storage center that employs about 22 people (Jones, 2/20/95). Another reconstituted leaf plant in Chesterfield County is Philip Morris' Park 500 plant (Jones, 4/25/95). These reconstituted leaf plants reclaim tobacco from "stems, dust and other debris" by meshing them into "paperlike sheets" (Neergaard). It is likely that these plants are included in the stemming and redrying standard industrial classification, given the presence of two such operations in Chesterfield County according to census figures.

Another tobacco-related operation in Virginia is the corporate headquarters for the Universal Corporation in Richmond. Recall that Universal is the largest tobacco leaf merchant in the country and world. Other smaller tobacco operations are present in the state, but are relatively less significant compared to those detailed so far. One of these smaller operations does fall in the *study region*, however. Imperial Processing Corporation is located in Kenbridge in Lunenburg County. Imperial is a subsidiary of the Universal Corporation that deals primarily in the processing of cigar filler and chewing tobacco scrap. Much of this tobacco is foreign imports, and none of it is flue-cured tobacco. Approximately two months per year, they process Virginia fire-cured tobacco purchased in the Blackstone and Lynchburg markets. The processed Virginia fire-cured tobacco is mostly exported. Seasonal employment will vary, with extra employees

working during the Virginia fire-cured processing period. However, the operation generally employs 45 hourly workers and 15 salaried workers[9].

Of course, there is much tobacco-related employment beyond these manufacturers. An example of companies with significant tobacco-related business is the transport industry. In addition to trucking and rail operations, there is also significant port activity for ship transport. One Virginia port has more tobacco-related exports than any other: Norfolk.

> *The port at Norfolk shipped about 40 percent of the tobacco and tobacco product volume passing through the 10 major U.S. ports* (Purcell, pp. 7-8).

In summary, tobacco production and its related operations cover a wide geographic region of Virginia in a diverse number of industries. This illustrates the broad scope of any analysis that attempts to capture all of these aspects and indicates the potential preference for a study with a reduced scope.

III.6 Statistical Boundaries

Statistical boundaries are usually semi-governmental in nature and exist for the purpose of collecting data for evaluation and planning. Defining a study region to conform with a statistical boundary may provide synergy in incorporating or verifying study data.

III.6.1 Agricultural Statistical Boundaries

Since this study focuses on tobacco, it would be useful to note those boundaries established for agricultural purposes. One long-standing classification scheme, used for flue-cured tobacco on a national level, breaks production into regions or *belts* where the tobacco is grown. These are the Old Belt, Middle Belt, New Belt (frequently referred to as the Eastern Belt), Border Belt and Georgia-Florida Belt. Flue-cured Types 11a, 11b, 12, 13 and 14 are used, respectively, to classify tobacco grown in these regions (Mann, p.

[9]This information is from Ms. Joyce Estes, Import and Office Manager for Imperial Processing Corporation.

28). In 1994, the Middle Belt was eliminated and these counties were included in the Eastern Belt. It should be noted that Type 11 is the only flue-cured type of tobacco grown in Virginia, and this falls entirely in the Old Belt.

Another national level scheme, the Census of Agriculture, breaks flue-cured tobacco into four subregions that appear to correspond closely to the belts above. The *study region* in the current study is a component of the Census Subregion 18, the Piedmont of North Carolina and Virginia. The other three regions are the Coastal Plain of North Carolina, the Pee Dee-Lumber River area of North and South Carolina, and a Georgia-Florida belt (Clauson, pp. 1-2). If the goal of this study is to look at the impact of all flue-cured Type 11 tobacco, then the study region would need to conform closer to Census Subregion 18 by adding appropriate North Carolina counties.

Agricultural data are collected by the Commonwealth of Virginia for seven *agricultural statistic districts* (Virginia Agricultural Statistics Service, 1993, p. 3). These boundaries have been used as the basis of reporting for at least one economic impact study pertaining to agriculture (Johnson and Wade). The *study region* falls into two of these statistic districts. Charlotte, Halifax, Lunenburg, and Pittsylvania counties fall into the Southern district along with the cities of Danville and South Boston. The South-eastern district includes Brunswick and Mecklenburg counties. Both of these districts contain counties and cities that are not part of the *study region*, some of which are obviously dissimilar or unrelated. One such example is the city of Virginia Beach in the South-eastern district, also easily the most distant entity from the center of the *study region*. Figure 3.4 illustrates the statistical boundaries.

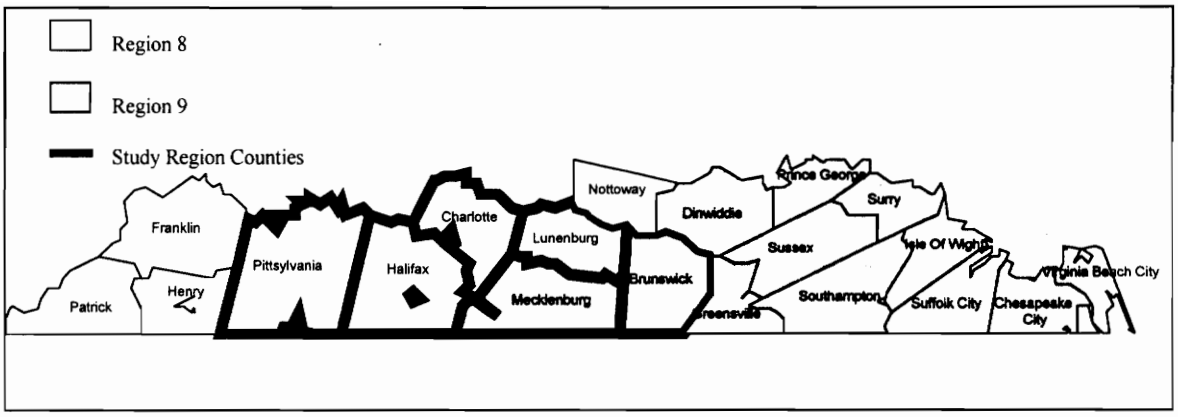


Figure 3.4 Virginia Agricultural Statistic Districts Covering the *Study Region*

The annual *Virginia Agricultural Statistics* report uses these agricultural statistic districts when reporting production figures for flue-cured Type 11 tobacco (Virginia Agricultural Statistics Service, 1993, p. 40). However, another reporting unit is used for tobacco sales. Seven markets, Chase City, Clarksville, Danville, Kenbridge, Lawrenceville, South Boston, and South Hill, are used to report flue-cured Type 11 sales data (p. 44). All of these markets are names of cities and towns located in the *study region*. These fall within five of the six counties in the region, Charlotte County being the only county without a market presence. Table 3.7 summarizes information about these markets.

Meanwhile, 15 markets for flue-cured Type 11 exist in North Carolina (North Carolina Department of Agriculture, Agricultural Statistics Division), all but 4 within 30 miles of the border. Table 3.8 provides a listing of these markets, the county of their location and 1994 sales. Figure 3.5, which immediately follows the table, provides a map of the location of Type 11 flue-cured tobacco markets in both Virginia and North Carolina.

Table 3.7 Virginia Flue-cured Type 11 Tobacco Market Statistics

Key[1]	Market	County of Location	Number of Warehouses	1994 Producer Sales in Pounds
4	Chase City	Mecklenburg	3	3,275,385
3	Clarksville	Mecklenburg	3	7,318,768
1	Danville	Pittsylvania	6	44,046,331
5	Kenbridge	Lunenburg	2	1,203,589
7	Lawrenceville	Brunswick	3	6,352,945
2	South Boston	Halifax	5	15,698,828
6	South Hill	Mecklenburg	4	8,279,622
	Total		26	86,175,468

Source: 1994 Virginia Agricultural Statistics, p. 47.

[1] 'Key' refers to the number on the associated map - see Figure 3.5.

Table 3.8 North Carolina Flue-cured Type 11 Tobacco Market Statistics

Key[1]	Market	County of Location	1994 Producer Sales in Pounds
22	Aberdeen	Moore	2,207,155
21	Carthage	Moore	7,039,124
19	Fuquary-Varina	Wake	19,260,062
14	Henderson	Vance[2]	11,748,755
18	Louisburg	Franklin	20,311,173
13	Oxford	Granville[2]	10,475,678
20	Sanford	Lee	6,066,616
15	Warrenton	Warren[2]	7,582,910
17	Burlington-Mebane	Alamance	4,008,518
10	Madison	Rockingham[2]	6,149,182
8	Mt. Airy	Surry[2]	10,876,082
11	Reidsville	Rockingham[2]	14,406,046
12	Roxboro	Person[2]	13,362,581
9	Stoneville	Rockingham[2]	3,420,645
16	Winston-Salem	Forsyth	32,448,550
	Total		169,363,229

Source: North Carolina Department of Agriculture, Agricultural Statistics Division, Internet address: http://www.agr.state.nc.us/stats/crop_fld/fldtwsyr.html.

[1] 'Key' refers to the number on the associated map - see Figure 3.5.

[2] County is located on the Virginia - North Carolina border.

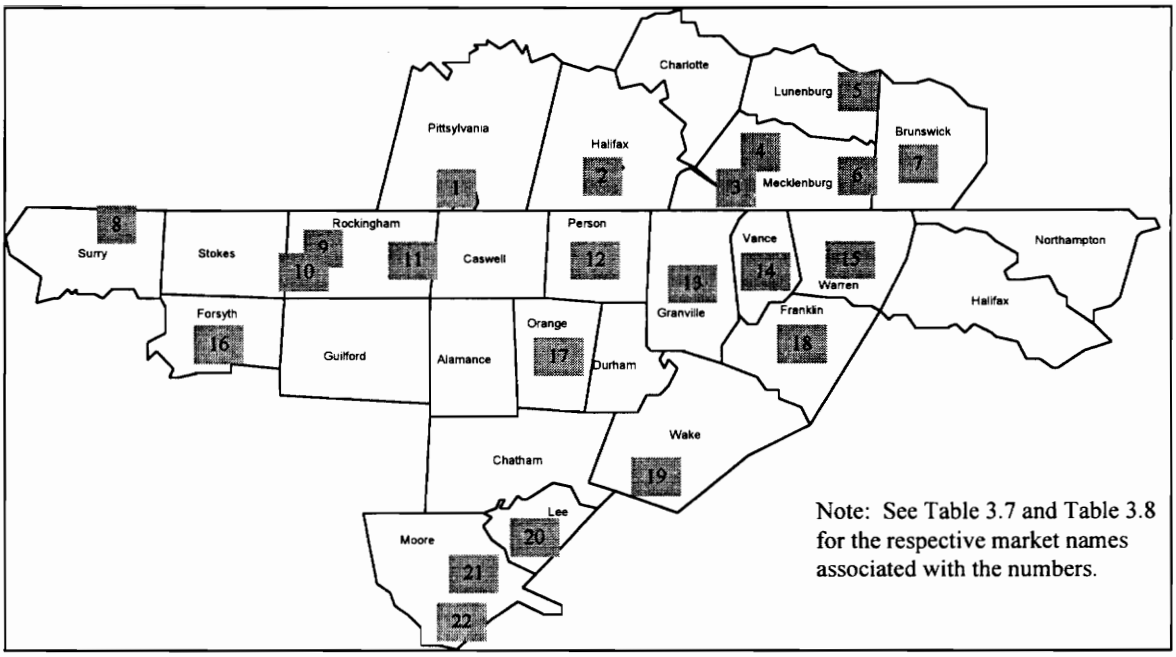


Figure 3.5 Flue-cured Type 11 Tobacco Markets in Virginia and North Carolina

Discussion with warehouse operators during visits made to two flue-cured tobacco auctions confirms that some cross-border sales occur. Chapter IV will discuss a survey of Southside flue-cured warehouses that includes a question about North Carolina-produced tobacco sold in Virginia warehouses. The Consolidated Farm Service Agency tracks these "across belt movements". Table 3.9 provides the volume and percentages of production of Virginia flue-cured tobacco sold in North Carolina. The table also provides the volume of North Carolina production sold in Virginia and its share of Virginia sales. These results indicate that Virginia tobacco warehouse operators gain more volume than North Carolina operators with this trade. In 1995, North Carolina-produced flue-cured tobacco accounted for 21.2 percent of sales in Virginia warehouses. Thus, caution must be exercised in using sales by market as a representation of regional production.

Table 3.9 Flue-cured Tobacco Cross-Border Sales Between Virginia and North Carolina

Year	Virginia Production, Sales in North Carolina (thousands of pounds)	Percentage of Total Virginia Production (%)	North Carolina Production, Sales in Virginia (thousands of pounds)	Percentage of Total Virginia Sales (%)
1992	8,521	10.7	21,259	22.9
1993	8,191	10.5	21,241	23.3
1994	6,907	9.5	20,244	23.5
1995	7,616	8.3	19,505	21.2

Source: Annual Consolidated Farm Service Agency internal reports.

III.6.2 Metropolitan Statistical Areas

Another division frequently used in economic evaluations is *Metropolitan Statistical Areas* (MSAs). MSAs are defined by the federal government's Office of Management and Budget. They tend to group a large population center, generally a city or urban/metropolitan area of over 50,000 in population, with adjacent areas that have "a high degree of economic and social integration" (Rand McNally, 1996, p. 55). There is one MSA in the *study region*, the Danville MSA. It incorporates the city of Danville and Pittsylvania County. The other five counties in the *study region* are not part of an MSA. Lynchburg, Richmond-Petersburg, and Roanoke are other proximate Virginia MSAs outside the study area, while Greensboro - Winston-Salem - High Point and Raleigh-Durham-Chapel Hill are the closest North Carolina MSAs (pp. 54-55). Only one North Carolina border county, Stokes County, is located in an MSA, but it is not immediately adjacent to the *study region* (p. 55).

III.6.3 BEA Economic Areas

The *study region* falls into two 1990 BEA Economic Areas. Area 021, Roanoke-Lynchburg, Virginia, contains Pittsylvania County and Danville. This economic area

contains three Metropolitan Statistical Areas: Danville, Lynchburg and Roanoke, and quite a number of nonmetropolitan counties. In total, it covers a large area of 26 Virginia counties and 1 West Virginia county. Area 022, Richmond-Petersburg, Virginia, contains the remaining five counties of the *study region* and South Boston. However, this is also a large area of 33 counties, some of which are part of 2 MSAs: Charlottesville and Richmond-Petersburg. Especially noteworthy is the fact that neither of these areas include North Carolina counties (U.S. Department of Commerce, pp. 22-23). North Carolina border counties adjacent to the *study region* are part of three other BEA Economic Areas[10].

A few conclusions can be reached from these definitions. The BEA Economic Areas do not provide any additional justification for including border North Carolina Counties in the *study region*. However, they do provide an argument for enlarging the *study region* with Virginia Counties. These BEA Economic Areas are much larger regions that reach beyond the focus on tobacco production.

III.6.4 Trading Areas

Rand McNally issues an annual publication that can be used to help companies plan a distribution program, because it emphasizes the distribution patterns of products in its designation of areas. The 127th edition divides the United States into 487 *Basic Trading Areas* and 47 *Major Trading Areas* (Rand McNally, 1996, p. 39). A Basic Trading Area surrounds a *principal business center* or other place of more that 25,000 in population. The residents within this area do most of their shopping and other purchases of services in the business center. A Major Trading Area is a larger region encompassing a large city that residents of a Basic Trading Area will travel to in order to purchase goods and

[10]Caswell and Rockingham Counties are part of Area 028, Greensboro - Winston-Salem - High Point, North Carolina. Granville, Person, Vance and Warren Counties are part of Area 027, Raleigh-Durham, North Carolina. Finally, Northampton and Halifax Counties are part of Area 024, Rocky Mount-Wilson-Greenville, North Carolina.

services that are not available in their principal business center (Rand McNally, 1973, p. 2).

The city of Danville is the only principal business center in the *study region* (Rand McNally, 1996, p. 95). It is also the basis for the Danville Basic Trading Area that includes the city of Danville, Pittsylvania County, Halifax County, and Caswell County of North Carolina (p. 39). Six other relatively close Virginia principal business centers are Lynchburg, Martinsville, Petersburg, Richmond, Roanoke and Salem (p. 95). Four of these contribute to three Virginia Basic Trading Areas that fall to the west and north of the *study region*: Martinsville, Roanoke and Lynchburg. The Richmond-Petersburg Basic Trading Area incorporates the remaining two of these principal business centers. It is a comparatively large region of more than 20 counties that includes the 4 counties in the *study region* not in the Danville Basic Trading Area. The cities of Richmond and Petersburg are north-east of the region. The entire *study region* falls in the Richmond Major Trading Area. This Major Trading Area includes the four Basic Trading Areas already discussed plus two others (p. 39).

Meanwhile, south of the border nearby principal business centers include Eden, Henderson, and Roanoke Rapids (p. 92). Three North Carolina Basic Trading areas contain counties adjacent to the *study region*. Greensboro - Winston-Salem - High Point contains Rockingham county which is south of the western corner of Pittsylvania County. The Raleigh - Durham Basic Trading Area contains Person, Granville, Vance and Warren Counties, all of which have common borders with the *study region*. Lastly, Roanoke Rapids includes Halifax County (North Carolina) which is adjacent to the eastern corner of Brunswick County. These are part of the larger Greensboro - Winston-Salem - High Point, Raleigh-Durham, and Rocky Mount-Wilson Major Trading Areas (p. 39).

It is important to note that there is only one instance of cross-over between state lines in this classification scheme. In this case residents of Caswell Country in North Carolina frequently travel to Danville for their shopping. The definition of all of these boundaries infers that residents of the *study region* do most of their shopping and purchase of services in Virginia.

A national USDA study by Fred Gale (1994), "What Tobacco Farming Means to Local Economies", created 24 different regions for its review. These 24 regions included 194 of 276 counties with 1987 census tobacco sales greater than $1 million. According to Gale's study, the selected counties are used to form regions that coincided with the greater part of Rand McNally trading areas (Gale, pp. 5-6). Two of these 24 regions contain the counties of the *study region*. Gale's "Danville" region contains Caswell (N.C.), Halifax, and Pittsylvania counties, while Gale's "Southside" region contains the four remaining study area counties plus four others. In the figures provided, these latter 4 counties made up 21 percent of the total tobacco sales for this region (p. 19).

It may be erroneous to call the Southside region a trading area. Although the 1990 Rand McNally guide is referenced, there is no such trading area in the 1996 guide. As explained in an earlier section, more than 20 counties are part of the Richmond-Petersburg Basic Trading Area. Thus, the Southside region is a subset of a trading area and would appear to exclude its largest city of Richmond. This study takes a different tact. It combines Gale's two regions and excludes the four smaller volume tobacco counties that are closer to the Petersburg and Richmond principal business centers. This provides one compact region that is strongly influenced by tobacco and that is more isolated from the Richmond area. By having one *study region*, the stemming and redrying industry will be present in the region being analyzed. This contrasts with Gale's division of the *study region* into two different regions, one without any stemming and redrying industry present. Chapter V analyzes Gale's study in additional detail.

III.6.5 Summary

In summary, a number of different forms of statistical boundaries have been examined: Agriculture Census Subregions, Agricultural Statistical Districts, Tobacco Markets, MSAs, BEAs, and Trading Areas. These different statistical boundaries point out that there is not one universal or consistent reporting unit for the general region of choice for this study.

III.7 Roads

Roads are an important component in transportation services for today's economy, and they influence economic development. Only one Interstate Highway crosses the *study region*. Interstate 85 crosses Brunswick and Mecklenburg Counties as a north-south connecting road between Petersburg, Virginia, and Durham, North Carolina. It also passes a tobacco center in Henderson, North Carolina. South Hill, in Mecklenburg County, is the only large town in the *study region* within a few miles of this highway.

Three federal routes are the other significant roads that cross the region. U.S. 58 runs east-west across the southern part of the region. The cities of Martinsville and Emporia are destinations on this road just outside both sides of the *study region*. U.S. 58 serves the cities of Danville and South Boston, plus the towns of Clarksville, South Hill, and Lawrenceville within the region. U.S. 29 runs north-south and connects Danville to the City of Lynchburg in the north and Greensboro, North Carolina to the south. U.S. 360 runs north-east - south-west between South Boston and Richmond, the latter being the capitol of the Commonwealth and the location of cigarette manufacturing. U.S. 360 shares the road with U.S. 58 between South Boston and Danville.

Perhaps just as important are the roads that hem the boundary of the *study region*. On the western side is U.S. 220 which runs north-south through Martinsville and the town of Rocky Mount. It connects the City of Roanoke in the north and Greensboro, North

Carolina in the south. On the northern edge is U.S. 460 which runs from Roanoke to Petersburg, and includes the cities of Bedford and Lynchburg and the town of Farmville. On the southern edge is Interstate 95 which runs north-south from Richmond, through Petersburg and Emporia, and further south fairly close to Wilson, North Carolina, another tobacco center. These three roads and the state border create a mat for framing a picture of the region[11]. Consideration was given to creating a larger study region defined by these three roads. While a larger result would be achieved for any impact analysis with this larger region, its relative impact in the areas where it matters the most would be diminished due to the addition of the cities of Roanoke, Lynchburg and Petersburg and their more diversified economies. The addition of Richmond would even further dilute the relative impact as previously discussed.

III.8 Commuting Patterns

Commuting patterns, or labor market analysis, are another means for assessing the appropriateness of the regional definition. An analysis of commuting patterns is one way to identify study areas that may be too small. For example, it may be appropriate to include a neighboring county in a study area if there is a significant number of laborers, called 'in-commuters', who commute into the study area. By adding a county that is a significant source of in-commuters to the study area, the employment and related consumption impacts being measured are kept more intact. If the county is not added to the study area, this can raise the complexity of accurately measuring the impacts net of the commuter losses (Henry and Johnson, p. 29). Finally, 'out-commuters' will be defined as those residents of the *study region* who work outside the *study region*.

[11]In North Carolina, Interstate 40 runs east-west and serves to connect the major tobacco center of Winston-Salem to many of these arteries and to Greensboro, Durham and Raleigh.

In order to assess the commuter flows, data are extracted from economic profiles of the three planning districts that contain counties in the *study region* (Park; Pelay; Yonkin, 1993a). The source data for these three studies are 1990 census data published in a 1993 Virginia Employment Commission report. The profile for each planning district has a table that can be best described as a matrix of in-commuters and out-commuters for the counties and cities within the planning district. In addition, in-commuter statistics are provided for significant counties outside the planning district. This provides enough detail to compile a new table for the *study region*. Table 3.10 gives the results.

Table 3.10 Southside Virginia Employment Commuter Flows

Location	Total Jobs	Residents Employed	In-Commuter[1]	% In	Out-Commuter[1]	% Out
Brunswick	5,192	6,340	662	12.75	1,753	27.62
Charlotte	3,728	5,129	553	14.83	1,506	29.36
Halifax	12,718	13,359	784	6.16	1,445	10.82
Lunenburg	3,646	5,025	372	10.20	1,242	24.72
Mecklenburg	13,759	13,088	923	6.71	1,352	10.33
Pittsylvania	14,711	26,861	1,684	11.45	6,671	24.84
Danville	31,084	22,851	2,612	8.40	1,992	8.72
South Boston	2,354	3,061	46	1.95	197	6.44
Total	87,192	95,714	7,636	8.76	16,158	16.88

Source: Compiled from Park, Pelay, and Yonkin.

[1] Numbers are commuter flows looking at the Southside region as a whole.

The in-commuter and out-commuter results provided in the table are for the *study region* as a whole. They may be slightly overstated, because some inter-county flows may not be disclosed in the planning district tables when they are small; these flows may be buried in aggregated 'elsewhere' totals. The in-commuter percentage is taken as a percentage of the 'total jobs' in the respective area. The out-commuter percentage is based on the number of working residents or 'residents employed'. The out-commuter percentage is larger than the in-commuter percentage for every county and city. The same holds true for the count of commuters except, not surprisingly, in the case of

Danville city where the number of in-commuters exceeds the out-commuters. The most important message from this table is that, for the *study region* as a whole, the net flow is 8,522 out-commuters, or almost nine percent of the residents employed[12]. Thus, the *study region*, to a small extent, is behaving as a bedroom community that benefits from jobs located outside the region. When measuring the impact of changes, if the affected industries are located in the *study region*, this net out-flow is preferable to an in-flow. This is related to the effect of additional household spending of resident workers.

Figure 3.6 illustrates commuting patterns within the *study region*. The first number in the circle indicates the percentage of residents employed in the area that work in the area. The percentages associated with the arrows measure commuters from that area. Combining these appropriately along with those smaller flows not disclosed yields the second number inside the circle; it adds the within region commuters to the non-commuter workers to give the total percentage of residents employed that remain within the *study region* for work. Some additional arrows indicate those significant flows of resident workers outside the *study region*.

Only two counties outside the *study region* account for more than ten percent of any county or city's out-commuters. A total of 622, or approximately 12 percent, of the residents employed in Lunenburg County commute to Nottoway County (Yonkin, 1993a, p. 40). Similarly, approximately 11 percent of the residents commute from Pittsylvania County to Campbell County. In total numbers, Campbell County is the largest provider of jobs to out-commuters from the region, providing 2,892 jobs to people from Pittsylvania County, 863 from Halifax County, and 374 from Charlotte County (Yonkin, 1993b, p. 42). The border towns of Altavista and Brookneal may provide jobs to a number of these commuters, while others may be commuting further to the greater Lynchburg area. There are 490 additional Pittsylvania County workers who make the

[12]The net flow is 16,158 out-commuters less 7,636 in-commuters.

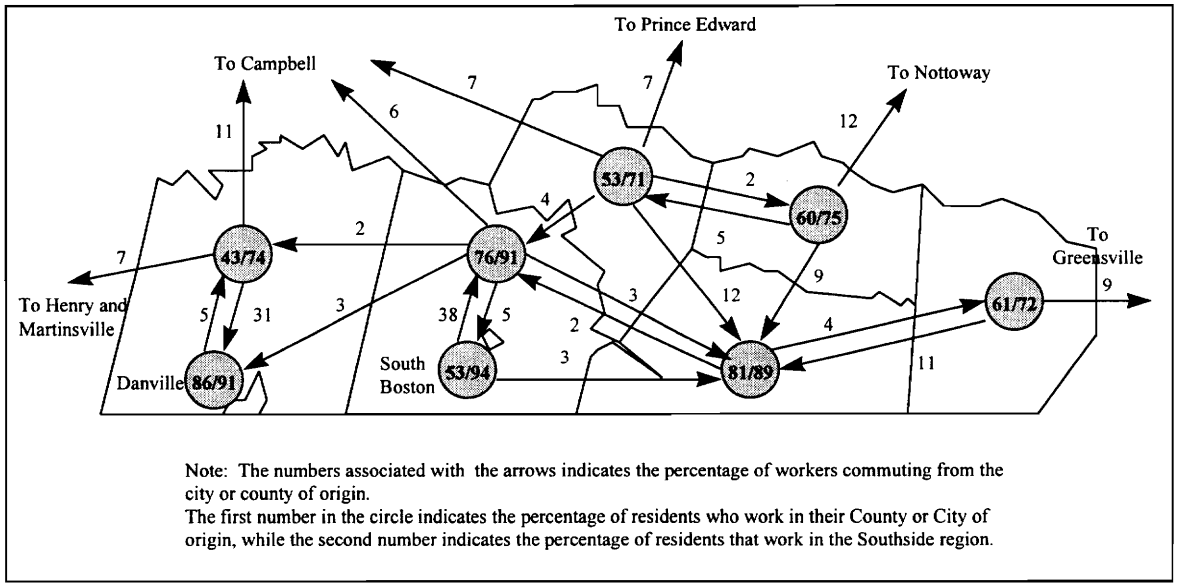


Figure 3.6 Commuting Patterns for Southside Virginia

commute to the city of Lynchburg (Yonkin, 1993b, p. 42). The commuting traffic north to Campbell County and Lynchburg exceeds the smaller, but significant, westward travel from Danville and Pittsylvania County to Martinsville and Henry County.

Figure 3.7 illustrates where some of the in-commuters originate from. This appears to be fairly evenly distributed to border counties around the *study region*. In total numbers, 1,444 jobs in Danville are filled by Caswell County, North Carolina residents. This represents 4.6 percent of the jobs in Danville. Another 552 jobs in Pittsylvania County are filled by Caswell County residents, or 3.8 percent of the jobs in Pittsylvania County (Park, p. 38). In percentage terms, the largest flow is from Prince Edward County into Charlotte, with 5.1 percent of the jobs in Charlotte held by Prince Edward County residents. This is only 190 commuters, however (Yonkin, 1993a, p. 40).

Considering the results of the commuter flows, there does not appear to be any justification for adding counties to the *study region*. The region is fairly cohesive, and as

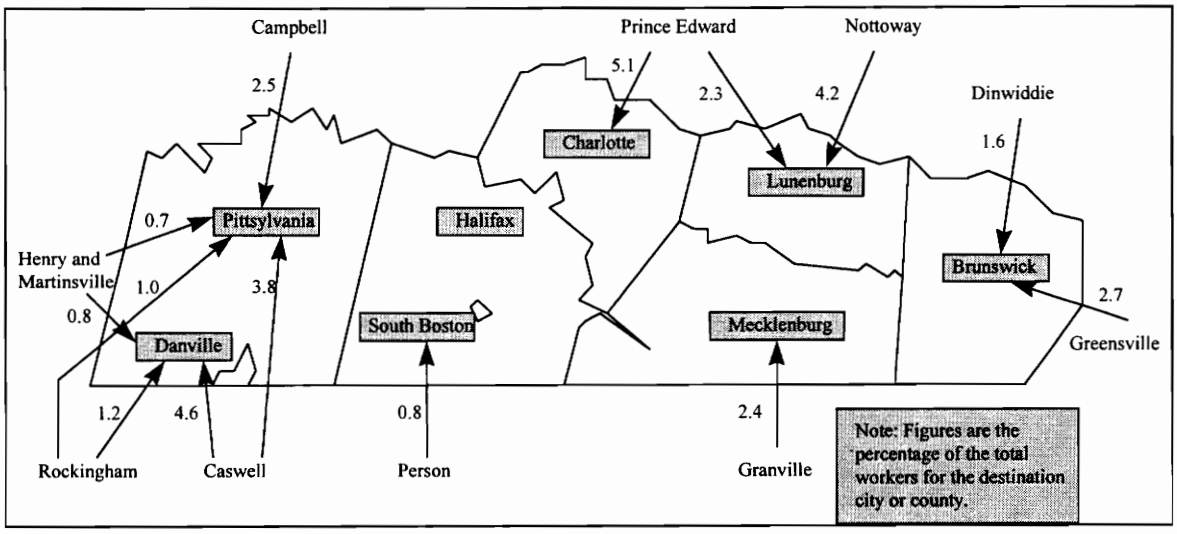


Figure 3.7 Southside Workers From Outside the *Study Region*

noted earlier, has a net commuter out-flow. For the region as a whole, the number of in-commuters is 8.76 percent of total jobs. This is an acceptable percentage that is unlikely to improve with the addition of other counties, because new counties may bring their own losses. Consider, for example, Campbell County where 43 percent of their resident workers commute to their northern neighboring city of Lynchburg (Yonkin, 1993b, p. 11). Nevertheless, these commuter statistics will be considered when conducting the impact analysis.

III.9 Border County Dilution

The previous section indicated some of the commuter movement between the *study region* and border counties. Commuters are not the only consideration. Residents also travel to do their shopping. This was also a consideration in the establishment of functional economic areas. Thus, it may be helpful to identify the border counties, cities and towns as possible candidates for shopping destinations. First, larger towns and cities in the *study region* will be identified (see Table 3.11). Then, they will be compared to Virginia and North Carolina border towns and cities in their immediate vicinity to determine likely shopping destinations.

The rural nature of the *study region* is one message that comes from the table of cities and towns. Outside the two cities of Danville and South Boston, there are only two towns above 2,000 in population. Excluding Danville and South Boston, the towns listed in the table make up only 11 percent of the region's population.

Table 3.11 *Study Region* Cities and Towns Greater than 1,000 in Population

County	City or Town	Population
Pittsylvania	Chatham	1,354
Pittsylvania	Danville	53,056
Pittsylvania	Gretna	1,433
Pittsylvania	Hurt	1,294
Halifax	South Boston	6,997
Mecklenburg	Chase City	2,442
Mecklenburg	Clarksville	1,243
Mecklenburg	South Hill	4,217
Lunenburg	Kenbridge	1,264
Lunenburg	Victoria	1,830
Brunswick	Lawrenceville	1,486

From Table 16.2A and Table 16.10, Virginia Statistical Abstract, 1994-1995 Edition. Uses 1990 Census data.

Eight counties in Virginia border the *study region*. Moving from west to east, these are Henry, Franklin, Bedford, Campbell, Appomattox, Prince Edward, Nottoway, Dinwiddie and Greensville. Larger cities or towns located within or adjacent to these counties, and their populations, are detailed in Table 3.12. Figure 3.8 provides a map with their locations with respect to the *study region*. Although not located in a border county, the position of the capital of the Commonwealth, Richmond, is indicated on this map. Richmond is approximately 20 miles north of Petersburg.

It seems unlikely that many residents of the *study region* would travel to Martinsville rather than larger Danville. Rocky Mount and Bedford are probably a shopping alternative for even less residents, as some shoppers traveling that direction may be

Table 3.12 Larger Cities and Towns in Virginia Counties Bordering the *Study Region*

County	City or Town	Population
Henry	Martinsville	16,162
Franklin	Rocky Mount	4,098
Bedford	Bedford City	6,220
Campbell	Altavista	3,686
Campbell	Brookneal	1,344
Campbell	Lynchburg	66,049
Prince Edward	Farmville	5,637
Nottoway	Blackstone	3,497
Nottoway	Crewe	2,276
Dinwiddie	Petersburg	37,027
Greensville	Emporia	5,479

From Table 16.2A and Table 16.10, Virginia Statistical Abstract, 1994-1995 Edition. Uses 1990 Census data.

willing to drive the extra distance to Roanoke. Perhaps the most likely shopping alternative to residents in the north-west of the *study region* is Lynchburg. Farmville may attract some of the north-central residents of the *study region*. Smaller border towns in the north-east and east may attract some shopping, but are not likely to offer much improvement over closer towns in the *study region*. Because Danville is located in the south-west corner of the *study region*, it is unlikely to be a shopping alternative for residents in the east. They are likely to travel to Petersburg or on to Richmond, or to look south of the border to North Carolina if they need to find items only present in larger population centers.

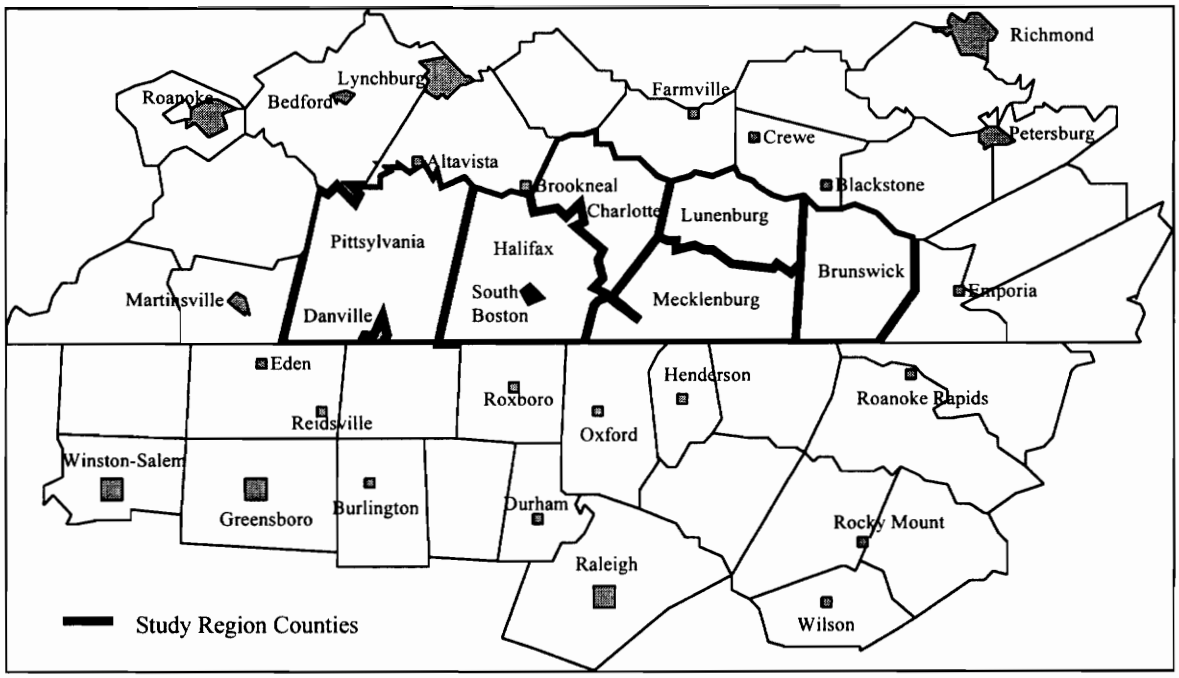


Figure 3.8 Border Cities and Towns of Southside Virginia

Moving from west to east, adjacent counties to the *study region* in North Carolina are Rockingham, Caswell, Person, Granville, Vance, Warren and Halifax[13]. Significant cities or towns located within these counties and their population are detailed in Table 3.13. Referring back to Figure 3.8, Eden is the closest of these cities and towns to the border, while all of them fall within 20 miles of the border. Counties just south of these border counties include the large population centers of Greensboro, Durham, and Raleigh, along with Winston-Salem just south-west of Rockingham County. To appreciate the proximity of these centers, downtown Greensboro is approximately 45 miles from downtown Danville.

[13]As explained previously, Halifax County, North Carolina, is not immediately adjacent to the study region, but should remain in this group of border counties.

Table 3.13 Larger Cities and Towns in North Carolina Counties Bordering the *Study Region*

County	City or Town	Population
Rockingham	Eden	15,238
Rockingham	Reidsville	12,183
Person	Roxboro	7,332
Granville	Oxford	7,913
Vance	Henderson	15,655
Halifax	Roanoke Rapids	15,722

Source: U.S. Bureau of the Census, 1990 Census of Population and Housing, Population and Housing Unit Counts, North Carolina. Table 8, pp. 16-44.

Eden, Reidsville and Roxboro are not likely to pose much of a shopping alternative, due to their proximity to larger Danville. Oxford and Henderson may be a shopping source for residents of Mecklenburg County who would travel down highways U.S. 15 and Interstate 85, respectively. Roanoke Rapids may be a shopping destination of some residents of Brunswick County. It would appear that the belt of larger cities in North Carolina would be a more viable alternative than Richmond for many of the residents of the *study region* when they go shopping for goods not available in the immediate area. Because of the nearly equidistant placement of some of these counties between Richmond and Raleigh-Durham, their inclusion in the Richmond Major Trading Area by Rand McNally may reflect political boundaries as much as anything.

Based upon this simple examination, it is possible that a number of different, mostly enlarged, regional definitions could be proposed based on cities and towns proximate to the *study region*. However, a conclusive, consistent argument for doing so was not found.

III.10 "Southside" Virginia: What's in a Name?

Much of this section has concentrated on the definition of the *study region*, but no consideration has been made of its name. The term "Southside Virginia" has had a long

historical application. Earlier in the Commonwealth's history, the name applied to the eastern counties of Virginia below the James River (Siegel, p. 11, p. 20). Application of this definition would more than double the size of the *study region* and add centers such as Lynchburg, Petersburg and Richmond. As time passed, the use of this term applied more often to a smaller, southern, core of this larger area.

A by no means exhaustive search gives an indication of more present-day usage of the term. Reports by two different economic development councils in 1955 and 1960 applied the name Southside to six counties: Brunswick, Dinwiddie, Greensville, Lunenburg, Mecklenburg, and Nottoway (The Southside Study Committee of the Advisory Council on the Virginia Economy; Southside Virginia Industrial Development and Economic Planning Council). This definition provides a more eastern viewpoint of Southside Virginia than the *study region*. It includes three of the six counties in the *study region*, dropping the western three counties, while adding three counties to the east.

The discussion of planning district commissions indicated that the boundary for the Southside Planning District was defined in 1969. It includes the counties of Halifax, Mecklenburg, and Brunswick and the City of South Boston. This is a smaller regional definition of Southside Virginia, and only overlaps the previous definition with Brunswick County.

A target industry study conducted in 1989 at the University of Virginia called its area Southside. This returned to a much larger definition of the area, one closer to the south of the James River definition, but excluding the large cities on the river and the south-eastern section of Virginia. This 20 county area encompasses all 6 counties of the *study region*. Eight of the fourteen additional counties are adjacent to the *study region*. Only one adjacent border county to the *study region* is excluded: Bedford County (Knapp, p. 1, pp. 7-8). The *study region* is the heart of this greater area.

The "Economic Impact of a Swine Complex in Southside Virginia" published in 1993, used yet another definition of Southside Virginia (Thornsbury, p. 1). This definition included five of the six counties in the *study region*, but excluded Pittsylvania county. It also added four additional counties: Amelia, Dinwiddie, Nottoway, and Prince Edward. These counties lie north-east of the *study region*.

These examples, while not exhaustive, support the use of Southside Virginia as a name for the *study region*. There is no universally accepted definition for this label, and application varies. The *study region* as defined frequently falls within areas of common use of the label.

III.11 Regional Choice Conclusion

Walter Isard, an eminent regional scientist, puts the choice of region into perspective:

> *To hedge against criticism, we may say that the set of regions we have identified represents the best we can do at the moment, given the pressures of time; and that we intend to look at this question again later (when we have more time) and do a better job. We should note that in practice, that "later" rarely comes; once we begin with a set of regions we find that diverse inflexibilities crop up and accumulate over time. It becomes increasingly difficult to change that set. We are usually "stuck" with that which we began* (1975, p. 12).

This statement is probably a little too cynical or overly pragmatic, and given the analysis of this chapter, it does not fully apply to this study. It does perhaps humorously suggest common practice.

The emphasis here is on rural Virginia's flue-cured tobacco-producing counties. A study that dispenses with the imposition of state boundaries could potentially improve the correct measurement of trade flows. A doubling of the region size by integrating the adjacent flue-cured producing North Carolina border counties may be beneficial in this regard. An attempt to include all of the stemming and redrying plants expands the region even further. However, further expansion makes it difficult to exclude the large

population centers of Richmond and Greensboro-Winston-Salem, reducing the desired ability to measure impacts on rural Virginia. Adding these centers would incorporate cigarette manufacturing, a forward linkage missing from the study, but it would be a very different study that provides less emphasis on the tobacco producers, their supporting businesses, and measures of impacts on the immediate region.

Relative to many studies, this study has made a significant effort to assess the regional choice; some studies provide no basis for the choice at all. Because of these efforts, many aspects of the *study region* have become better understood. This will be useful to later sections. The next step at this time is to complete the understanding of the economy of the *study region* with a regional descriptive analysis.

Chapter IV

Regional Descriptive Analysis

IV.1 Introduction

Input-output analysis is frequently chosen for regional analysis because it provides several types of information. It is an excellent descriptive tool, showing in detail the structure of an existing regional economy. It provides important information on individual industrial sector size, behavior and interaction with the rest of the economy. It shows the relative importance of sectors in terms of their sales, wages, and employment. It also provides a way to predict how the economy will respond to exogenous changes or changes that are planned. Therefore, it is useful in prescriptive exercises where various actions are being considered and the relative merits are to be determined based upon alternative outcomes.

-- Hastings and Brucker, p. 2.

The Hastings and Brucker quotation, up to the point involving prediction, describes the nature of this chapter. This chapter uses input-output analysis to perform a regional *descriptive analysis*. Chapter V explains the theory behind the use of input-output for predictive purposes. The predictive application of input-output in this study is found in Chapter VI. However, before any predictions about an economy are made, it is important to first have a good grounding in the nature of the economy.

A descriptive analysis is essentially an economic description of the study region's economy that is used to gain a better understanding of the economy (Siverts, p. 2-5). One component of a descriptive analysis is the study and comparison of the "current economic activity level" of individual sectors of the economy employing a variety of measures. The second component is to study the "interrelationships" between these sectors, frequently performed with the use of multiplier analysis (Siverts, pp. 2-22 - 2-23).

A third component that describes the regional economy's level of *diversity* and *dependency* is sometimes added to a descriptive analysis (Siverts and Green, p. 5-2). One analyst sees economic diversity as "... a 'snap-shot' cross-section of the base and supporting industries and sectors for each economic area...", whereas, "economic dependency concentrates on just those base industries and sectors which tend to generate the initial economic activity which then 'ripples' through the other industries and sectors in the economy" (DeVilbiss, p. 5). A diversity and dependency analysis with regard to tobacco in the Southside *study region* is of particular importance to the overall purpose of this study, because of concerns about future change for this industry.

This chapter will address all three of the descriptive analysis components. This study will be limited to the selection and performance of those methods judged to be most valuable in gaining an understanding of the regional economy. IMPLAN will provide most of the data for this analysis. The analysis can be performed at several levels. Section IV.3 will look at the economy at a very aggregated level in order to gain a basic understanding of its general make-up. Section IV.4 will examine the economy at a much more detailed level, taking advantage of IMPLAN's disaggregation of the economy into 528 sectors.

IMPLAN is rather limited in some information that it can provide about the regional economy, particularly demographic information (Siverts and Green, p. 5-1). In this regard the IMPLAN dataset can only provide the area of a county in square miles, the

county's population and the total number of jobs. Therefore, before presenting the analysis using IMPLAN data, Section IV.2 provides demographic information. Finally, Section IV.5 provides additional detail on the focus of this study, the tobacco industry.

IV.2 Demographic Information

Table 4.1 provides the population for each county in the Southside *study region.* Pittsylvania and Halifax counties are the two most populous counties, boosted by the inclusion of the independent cities of Danville and South Boston in the totals provided. The population of Danville is 60,053, while South Boston's is 6,997. These 2 cities constitute just over 31 percent of the total population of 213,093 in the *study region.* Table 3.11 provides the population of all cities and towns in the *study region* that have more than 1000 residents. Nine additional towns in this table account for another 8 percent of the region's population, or 16,563 residents. These cumulative urban population percentages mean that more than half of the residents in the *study region* are residents of rural areas or towns of less than 1000 residents.

Table 4.1 also includes the farm population for each county. The farm population makes up almost four and a half percent of the region's total population. Counties that are absent larger cities or towns, such as Lunenburg County, have a higher percentage of their population participating in farming. Although the Southside farm population is a relatively small percentage of the total, it is still higher than the one and a third percent measured for the entire Commonwealth of Virginia. However, the Southside farm population proportion does indicate that many of the rural area or small town residents are not part of the farm population.

Table 4.1 Regional Total Population and Farm Population Comparison

County or County and City	1990 Farm Population	1990 Total Population	Farm Population Share (%)
Brunswick	832	15,987	5.20
Charlotte	733	11,688	6.27
Halifax and South Boston	2,176	36,030	6.04
Lunenburg	827	11,419	7.24
Mecklenburg	1,247	29,241	4.26
Pittsylvania and Danville	3,606	108,728	3.32
Region Total	9,421	213,093	4.42
Virginia	80,560	6,187,358	1.30
Region / Virginia	11.69 %	3.44 %	

Source: Table B. Counties, *County and City Data Book: 1994*, p. 578, 587, 592, 601, 606, 615

Table 4.2 begins to describe some of the age and education characteristics of the Southside *study region*. The 1990 census figures indicate that the region has roughly the same proportion of its population under 18 years of age as the Commonwealth of Virginia. However, at the other end of the age scale, the Southside region has a greater percentage of its population 65 years of age or over. Although these two statistics do not give a complete picture of the range of ages, the Southside region is older on average than the rest of the Commonwealth. The last column of the table shows that the Southside region has a significantly smaller proportion of its population as high school graduates than the Commonwealth, ranging from 50.5 percent in Brunswick County to 59.6 percent in South Boston. Virginia has just over 75.2 percent of its population as high school graduates. It is likely that the higher age of the Southside region is correlated with the lower level of educational attainment. The region has also experienced an on-going out-migration of residents that likely influences these statistics[14].

[14]Every county in the region experienced a net out-migration in population for the period 1980 to 1990 except Brunswick County (Park, p. 2; Pelay, p. 3; Yonkin, 1993a, p. 3). Halifax County experienced a seven percent out-migration for this period (Pelay, p. 3). Out-migration is a longer term trend than this ten-year period. A 1960 report for six counties, including Brunswick, Lunenburg and Mecklenburg, noted heavy out-migration and the need for more jobs to stop it (Southside Study Committee, p. 1 and 8).

Table 4.2 Regional Population Age and Education Indicators

County	1990 Percentage of Population Under 18 Years of Age (%)	1990 Percentage of Population 65 Years of Age and Over (%)	1990 Percentage of Population High School Graduate (%)
Brunswick	24.0	14.3	50.5
Charlotte	24.8	17.2	52.1
Danville	22.6	18.7	57.4
Halifax	24.4	16.5	51.6
Lunenburg	25.9	17.1	52.2
Mecklenburg	23.4	17.2	58.1
Pittsylvania	24.3	13.4	56.1
South Boston	23.5	20.2	59.6
Virginia	24.3	10.7	75.2

Source: Federal Government Statistics maintained at http://govinfo.kerr.orst.edu, USA Counties.

Table 4.3 provides some statistics that measure social welfare. These statistics are for different years, and thus are not entirely comparable, and they are also dated. However, some generalizations with respect to averages for the Commonwealth can be made that likely hold true today. Southside Virginia has more people in poverty and a lower per capita income than the Commonwealth. Unemployment rates for the Southside region also run higher than the Virginia average. Unemployment rates have fallen since the 1991 figures provided, but it appears that Southside still lags behind[15]. Virginia Employment Commission figures showing average annual unemployment rates for 1994 for the MSAs in Virginia indicate that the Danville MSA has the highest rate, 7.4 percent, of all MSAs, and that the Danville MSA is also higher than the Virginia average (http://www.state.va.us/vec/lmi.html).

All of the statistics from the last two tables lead to a general conclusion that the Southside region has a less robust economy than Virginia on average, with less opportunity for its

[15]According to the Virginia Employment Commission, the February, 1996, unemployment rate for the Commonwealth was the lowest February rate in six years.

residents. Given this situation, any negative shocks to the regional economy could have a more severe impact on residents than an equivalent shock in other regions. This assumes other regions with more robust economies have more capacity to both absorb a negative impact and to find alternatives. The next two sections will look at the economic diversity and dependency of the Southside economy to illustrate if any sectors are capable of producing a severe impact on the economy if that sector faces a negative shock.

Table 4.3 Regional Social Welfare Indicators

County	1989 Persons Below Poverty (%)	1991 Unemployment Rate (%)	1992 Per Capita Income ($)
Brunswick	24.7	9.8	12,295
Charlotte	19.4	8.6	13,684
Danville	19.0	11.1	(1)
Halifax	16.7	8.1	14,476
Lunenburg	19.1	17.7	13,215
Mecklenburg	16.5	8.5	15,023
Pittsylvania	12.2	8.8	15,688
South Boston	15.3	7.6	(2)
Virginia	10.2	5.8	20,934

(1) Danville is included in Pittsylvania.
(2) South Boston is included in Halifax.

Source: Federal Government Statistics maintained at http://govinfo.kerr.orst.edu, USA Counties and REIS.

IV.3 Economic Comparisons at a Highly Aggregated Level

This section will provide a broad overview of the make-up of the regional economy. Table 4.4 begins by contrasting 1990 farm earnings and manufacturing earnings for the counties of the *study region*. Farm earnings in proportion to manufacturing earnings are higher for the Southside region than for Virginia as a whole. Pittsylvania, Halifax and Mecklenburg Counties have more manufacturing relative to farming than Brunswick, Charlotte and Lunenburg Counties. In no case does farm earnings exceed a third of manufacturing earnings. It should be noted, however, that some manufacturing is dependent on farm purchases and activities.

Table 4.4 Regional Farm and Manufacturing Earnings

County or City and County	1990 Farm Earnings ($)	1990 Manufacturing Earnings ($)	Farm to Manufacturing Proportions (%)
Brunswick	6,395,000	27,859,000	22.95
Charlotte	6,776,000	24,556,000	27.59
Halifax and South Boston	13,587,000	125,873,000	10.79
Lunenburg	6,383,000	23,583,000	27.07
Mecklenburg	10,385,000	97,026,000	10.70
Pittsylvania and Danville	20,643,000	395,424,000	5.22
Region Total	64,169,000	694,321,000	9.24
Virginia	716,440,000	12,572,910,000	5.70
Region / Virginia	8.96 %	5.52 %	

Source: Table B. Counties, *County and City Data Book: 1994*, p. 587, 588, 601, 602, 615 and 616.

Manufacturing is a rather generic term and often provides a limited view of the economy. IMPLAN can be used to provide more detail[16]. Table 4.5 provides a break-down of different sectors of the Southside economy aggregated by the same first digit of the Standard Industrial Classification (SIC) code. This results in an aggregation into nine different 'industry' categories. Six different measures are provided for each industry category using 1992 data[17]. Each measure has its explanatory uses, but total industry output (TIO), value added and employment in jobs will be examined in more detail. Total industry output is almost $7 billion. The value added portion of this output is over $3 billion. Employment related to the output is over 100,000 jobs (not necessarily full-time equivalents)[18].

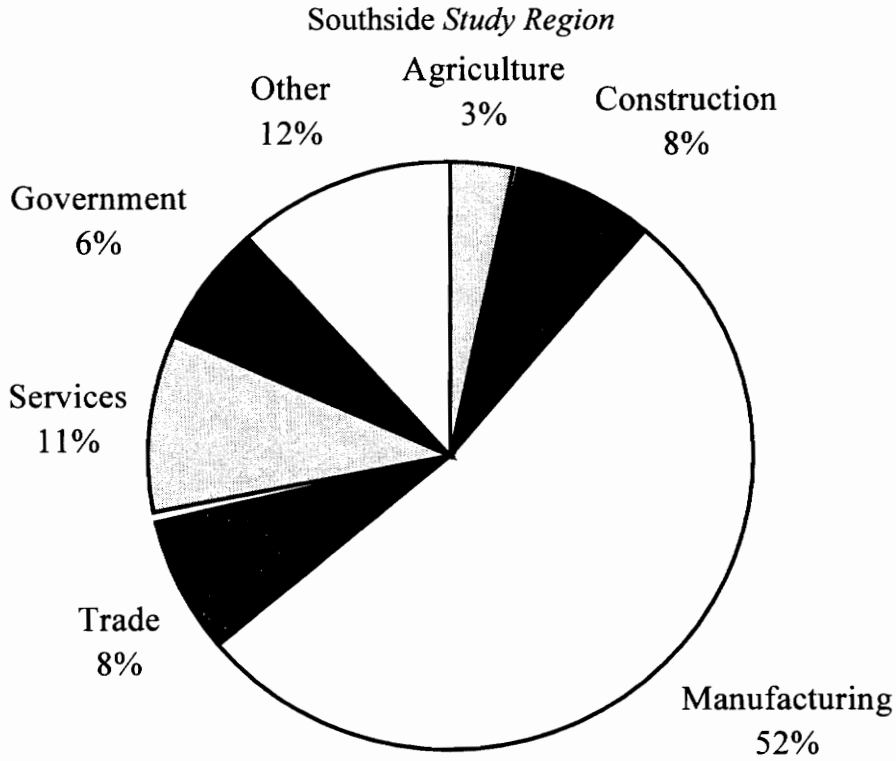
[16]Chapter V will provide explanation on how IMPLAN figures are generated.
[17]Six measures are noted, but there are seven columns of data. The column 'PoW' is the sum of employee compensation income and property income.
[18]Chapter V will explain these measures in detail.

Table 4.5 1992 Southside *Study Region* Base Economy Aggregated by 1-Digit Standard Industrial Classification Code

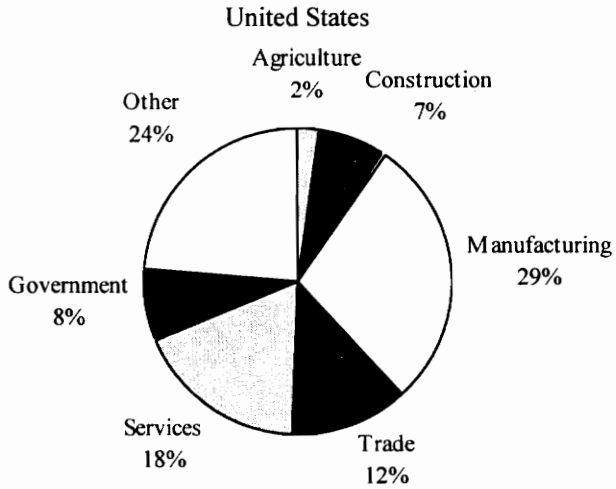
Industry	Base Year Final Demand ($ Mil.)	Base Year TIO ($ Mil.)	Employ. Comp. Income ($ Mil.)	Prop. Income ($ Mil.)	Total PoW Income ($ Mil.)	Total Value Added ($ Mil.)	Employ -ment (No. of Jobs)
AGRICULTURE, FORESTRY & FISHERIES	163.5065	235.3529	25.2152	88.4061	113.6212	116.747	8022
MINING	13.2741	13.6312	4.3797	3.1744	7.5541	8.2069	163
CONSTRUCTION	448.4294	556.4825	127.8335	94.6647	222.4982	224.301	7503
MANUFACTURING	3089.755	3638.603	705.6609	481.3007	1186.962	1215.926	27045
TRANSPORTATION, COMMUNICATIONS & UTILITIES	97.429	280.5863	77.5569	66.3595	143.9165	157.7644	2788
WHOLESALE & RETAIL TRADE	442.2619	531.0553	233.6244	64.5338	298.1581	384.6404	17897
FINANCE, INSURANCE, & REAL ESTATE	445.34	519.9003	53.7663	185.4292	239.1956	321.0625	3248
SERVICES	618.9096	739.0963	335.0485	143.4768	478.5255	487.9536	21016
GOVERNMENT	403.4738	436.5331	379.1284	22.4766	401.6051	401.6344	15599
Inventory Valuation Adjustment	0	-3.9536	0	-3.9536	-3.9536	-3.9536	0
Total	5722.379	6947.287	1942.214	1145.868	3088.083	3314.283	103281
Population = 214300.							

Source: IMPLAN 9A1 Report.

Pie charts are prepared for these three measures using Table 4.5 data. Seven industry categories are displayed: the 'mining', 'transportation, communications and utilities' and 'finance, insurance, and real estate categories' are summed to form 'other'. Figure 4.1 analyzes total industry output. The larger pie chart shows that manufacturing is approximately half of the economy for this measure, with the other categories fairly evenly allocated. Agriculture is the smallest category in this classification scheme. A smaller pie chart has been added that shows the same industry output classification scheme using figures for the entire United States economy. The largest difference in the two charts is that manufacturing is a much smaller proportion of the United States economy than for the Southside *study region*. Two industries account for a large part of



Note: The figure above shows total industry output by category for the Southside *study region.*



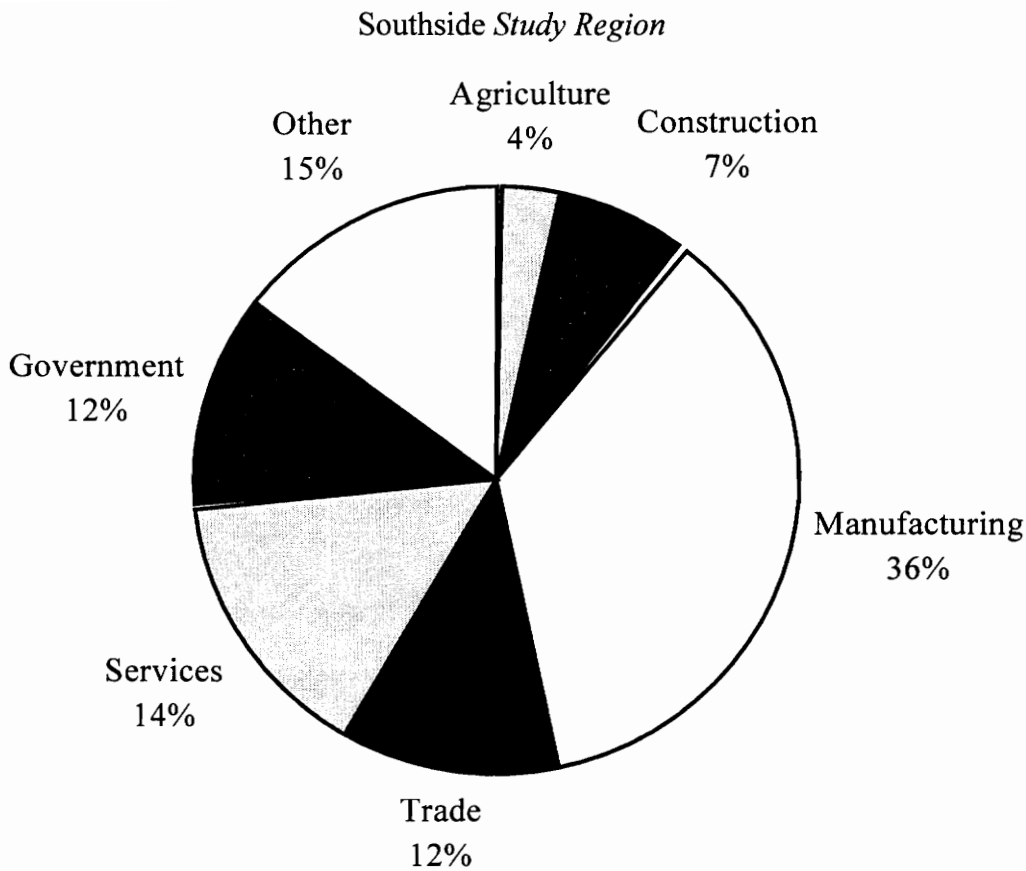
Note: Shows total industry output by category for the United States economy. This can be compared to the Southside economy in the larger figure above.

Figure 4.1 Categorization of the Economy for Total Industry Output

the difference. 'Services' and 'finance, insurance and real estate' are both individually more than seven percent larger in the United States economy. This comparison shows that Southside Virginia is less diversified than the United States economy as a whole.

Sectors 15, tobacco, and 107, tobacco stemming and redrying, can be combined and compared to the remaining sectors of the Southside economy (not shown in the figure). The two tobacco sectors account for 12 percent of the regional industry output, a significant share. Note that the tobacco sector is included in the total for the 'agriculture, forestry and fisheries' category in Table 4.5 and Figure 4.1. The tobacco stemming and redrying sector is part of the 'manufacturing' category.

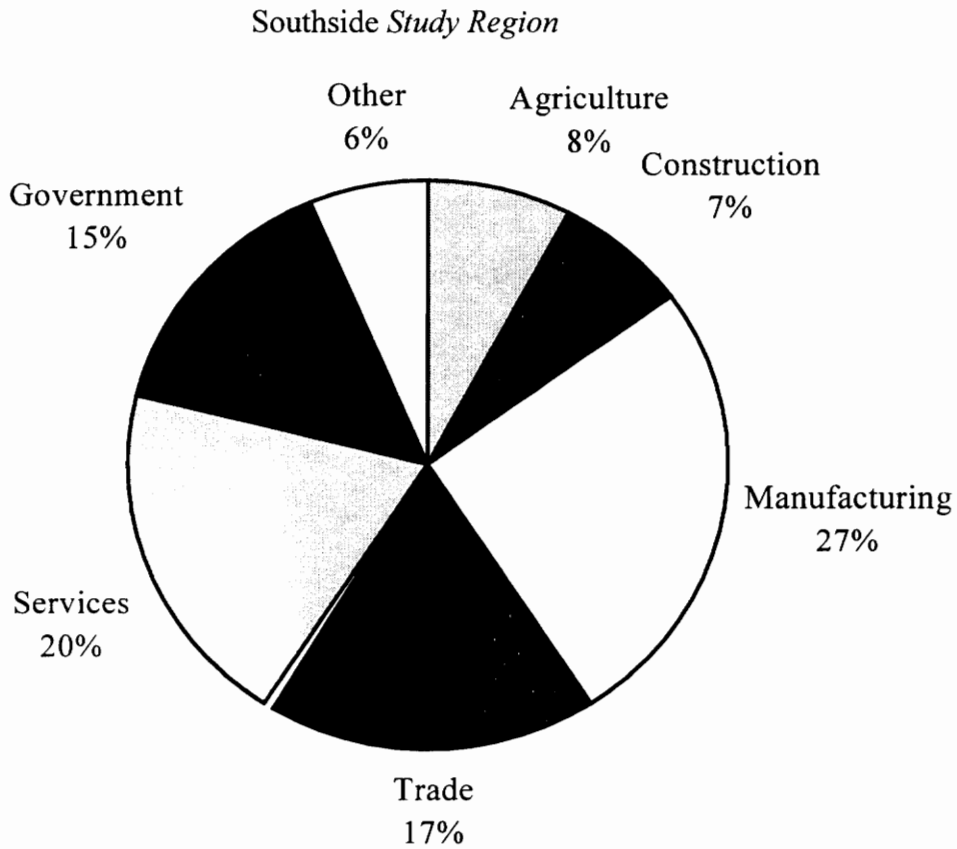
The next pie chart analyzes value added. Two things change in Figure 4.2. Manufacturing is much less significant to value added than to total industry output. Construction declines slightly as well, while all other sectors have larger shares for value added than they did for total industry output. The combined tobacco sectors also have a smaller share of the entire Southside economy with the value added measure, contributing seven percent (not shown in the figure). The tobacco stemming and redrying sector is responsible for more of the relative decline of this measure (relative to the total industry output share) than the tobacco sector.



Note: The figure above shows value added by category for the Southside *study region.*

Figure 4.2 Categorization of the Economy for Value Added

Jobs are charted in Figure 4.3. Manufacturing has its smallest share of the pie with this measure, providing less than a third of the jobs. Agriculture, on the other-hand, is no longer the smallest segment of the pie, it is now larger than two other segments. The combine tobacco sectors share remains the same as for the value added measure at seven percent (not shown in the figure). Care must be taken in interpretation of this chart, because no consideration is made of the quality of the jobs being offered or their duration.

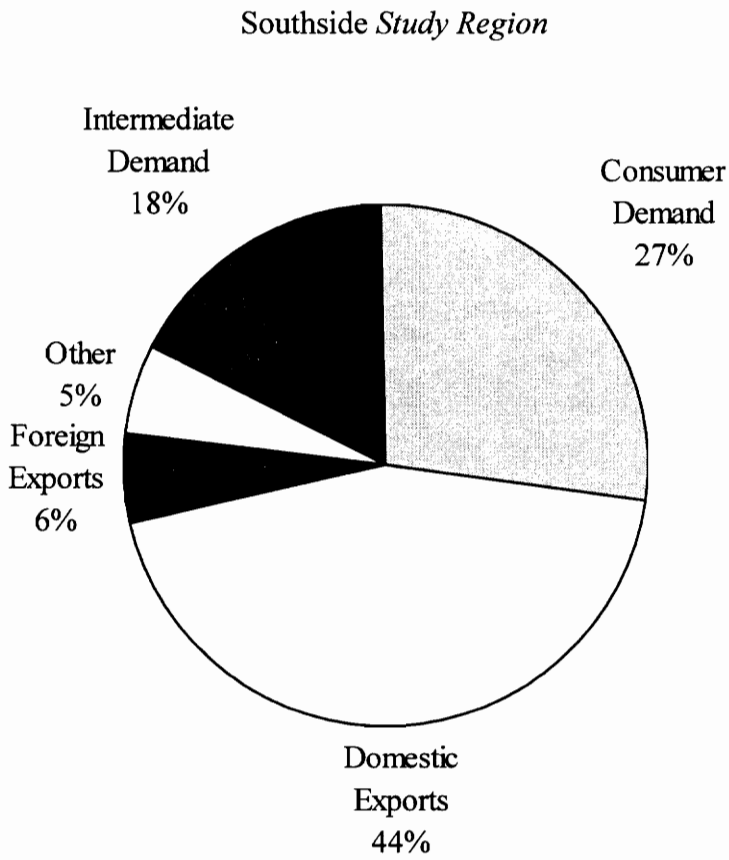


Note: The figure above shows value added by category for the Southside *study region.*

Figure 4.3 Categorization of the Economy for Jobs

So far analysis has only looked at those sectors of the economy that are responsible for generating total industry output and related measures. Another way to look at a regional economy is to determine where the total industry output is consumed or to find the components of demand for the region. Figure 4.4 provides this analysis for the Southside region. The five demand components of total industry output illustrated are foreign exports, domestic exports, consumer demand, intermediate demand and 'other'[19]. Totals for inventory additions and capital formation are combined to form the 'other' component of demand. All of the totals used come from the IMPLAN 303 Report.

[19]Intermediate demand is the use of outputs of one industry as an input to production for another industry.



Note: The figure above shows the different demand components of total industry output for the Southside *study region.*

Figure 4.4 Demand Components of Total Industry Output

Exports make up approximately half of the demand for the region's industry output. Domestic exports are $3038.72 million and foreign exports are $399.16 million, for a total of $3437.88 million in exports. Some regional economists place an emphasis on exports in analyzing regional growth. Section IV.4 will look at the role of exports in the Southside economy in more detail. Consumer demand within the region for the region's products is less than a third of total demand. Intermediate demand is shown at 18 percent of demand. This pie chart does not reflect how much of consumer demand and intermediate demand is met by imports rather than by regional industry output. Total commodity imports for the same period are higher than industry exports. Total imports

are $3886.92 million, with $3618.94 million as domestic imports and $267.98 million as foreign imports (IMPLAN 003 Report). Opportunities for import substitution may exist in the Southside *study region*.

IV.4 Economic Comparisons at a Disaggregated Level

While the previous section gave a broad overview of the make-up of the regional economy, this section begins with the same figures at a more disaggregated level. Section IV.4.1 will describe the most significant sectors using the same measures used in the previous section. The aim of the section is to provide a better insight about the diversity and dependency of the economy with respect to these key sectors. Section IV.4.2 looks at the interconnectedness of sectors in the economy, describing those sectors that will lead to wider regional growth for an increase in demand for their output.

IV.4.1 Regional Diversity and Dependency

The national economy in the IMPLAN model has 528 sectors. The model prepared for the Southside *study region* has 256 of these sectors, since not all sectors are present in the regional economy. The 256 sectors are sorted in descending order by total industry output, value added and employment in jobs to produce Tables 4.6, 4.7 and 4.8. These tables list the top ten sectors for each of the measures in order to begin to gauge the level of diversity and dependency in the economy for significant sectors.

Some studies compare each sector's proportion of the economy to national proportions, or utilize some other technique, such as location quotient and shift-share analysis. This is beneficial in that it shows that some sectors are normally larger or smaller than other sectors. This work is beyond the scope of this study. However, some assumptions with regard to national norms will be made when analyzing the results for each table.

Table 4.6 Southside 1992 Top Ten Sectors Ranked by Total Industry Output

IMPLAN Sector Number	Sector Name	Total Industry Output ($ Millions)	Percentage of Total Industry Output (%)
108	Broadwoven Fabric Mills and Finishing	752.352	10.83
107	Tobacco Stemming and Redrying	725.122	10.44
191	Plastic Materials and Resins	474.741	6.83
461	Owner-Occupied Dwellings	262.849	3.78
522	State & Local Government - Education	221.010	3.18
48	New Residential Structures	192.365	2.77
492	Hospitals	166.369	2.39
124	Apparel Made From Purchased Materials	152.579	2.20
490	Doctors and Dentists	150.323	2.16
267	Nonferrous Wire Drawing and Insulating	129.115	1.86
	Top 10 Subtotal	3226.825	46.45
	Regional Total	6947.286	100.00

Source: Figures are taken from IMPLAN 901A Report, except percentages are calculated.

Examination of all three tables indicates that there is one manufacturing leader for all three measures: broadwoven fabric mills and finishing. A non-manufacturing sector, education by state and local government, actually leads the jobs category, but broadwoven fabric mills and finishing ranks second. Chapter III described the development of textile mills on the Dan River in the 1880's. Textile companies such as Dan River, Inc. still remain from that time and continue to exert a powerful force on the regional economy.

Another leading manufacturing sector for two of the measures is tobacco stemming and redrying. Tobacco stemming and redrying is close behind the leader in total industry output, with over ten percent of the total regional industry output. It ranks fourth in value added. While tobacco stemming and redrying does not rank in the top ten for jobs

produced, the tobacco sector does. Over five percent of regional jobs, or 5,455 jobs, are in the tobacco sector. Not reflected in the top ten in Table 4.8 are the 1,442 regional jobs in the tobacco stemming and redrying industry.

Table 4.7 Southside 1992 Top Ten Sectors Ranked by Value Added

IMPLAN Sector Number	Sector Name	Total Value Added ($ Millions)	Percentage of Total Value Added (%)
108	Broadwoven Fabric Mills and Finishing	265.720	8.02
522	State & Local Government - Education	221.010	6.67
461	Owner-Occupied Dwellings	188.333	5.68
107	Tobacco Stemming and Redrying	183.738	5.54
191	Plastic Materials and Resins	147.993	4.47
490	Doctors and Dentists	128.318	3.87
492	Hospitals	117.997	3.56
447	Wholesale Trade	75.405	2.28
48	New Residential Structures	68.711	2.07
523	State & Local Government - Non-education	64.437	1.94
	Top 10 Subtotal	1461.662	44.10
	Regional Total	3314.282	100.00

Source: Figures are taken from IMPLAN 901A Report, except percentages are calculated.

Plastic materials and resins is a third manufacturing sector that ranks highly for the two measures other than jobs. State and local government - education, new residential structures, and hospitals are three sectors found in the top ten for all three measures. The top ten sectors for jobs includes a number of government and services sectors. For example, eating and drinking establishments and food stores account for more than 7,500 jobs, or over seven percent of the total jobs in the region. This is still approximately 500 fewer jobs than the broadwoven fabric mills and finishing sector. However, the jobs in this latter industry are concentrated in Pittsylvania County, while the services and tobacco jobs are spread somewhat more evenly throughout the region.

Table 4.8 Southside 1992 Top Ten Sectors Ranked by Employment (in Jobs)

IMPLAN Sector Number	Sector Name	Total Employment (Jobs)	Percentage of Total Employment (%)
522	State & Local Government - Education	9836	9.52
108	Broadwoven Fabric Mills and Finishing	8017	7.76
15	Tobacco	5455	5.28
454	Eating & Drinking Establishments	4335	4.20
492	Hospitals	3912	3.79
450	Food Stores	3203	3.10
48	New Residential Structures	2816	2.73
124	Apparel Made From Purchased Materials	2806	2.72
523	State & Local Government - Non-education	2556	2.47
525	Household Industry - Low Income	2371	2.30
	Top 10 Subtotal	45307	43.87
	Regional Total	103281	100.00

Source: Figures are taken from IMPLAN 901A Report, except percentages are calculated.

For all 3 measures, the top 10 sectors account for more than 40 percent of the regional total for that measure. Thus, key sectors make up a significant part of the economy. Excluding governmental sectors, it appears from the top ten rankings for these three measures that two industries are out in front of the others in the region: textiles and tobacco. The textile and tobacco industries are two industries where a negative impact would clearly disrupt the Southside region.

According to export base theory, first described in Chapter III, exports from a region drive regional growth. A relatively recent study by the Forest Service for the Rocky Mountain Region uses export base analysis to measure regional dependency. The Forest Service study measures dependency

> *by the percentage of final demand that each sector produces for the export market. On a relative basis, the larger the percentage of total exports in a given*

sector, the greater the dependence of the rural economy on that sector (DeVilbiss, p. 6).

Using the Forest Service measure of dependency, more than half the sectors in the Southside region are highly dependent on exports. Out of 265 sectors in the regional economy, 104 sectors have over 90 percent of their final demand based on exports. More useful for the Southside economy is an examination of export dependence in absolute terms. Table 4.9 ranks the top ten sectors based on levels of exports.

Table 4.9 Southside 1992 Top Ten Sectors Ranked by Exports (Foreign and Domestic)

IMPLAN Sector Number	Sector Name	Total Exports ($ Millions)	Percentage of Total Exports (%)
107	Tobacco Stemming and Redrying	637.784	18.55
108	Broadwoven Fabric Mills and Finishing	627.128	18.24
191	Plastics Materials and Resins	391.803	11.40
267	Nonferrous Wire Drawing and Insulating	125.668	3.66
124	Apparel Made From Purchased Materials	90.434	2.63
461	Owner-Occupied Dwellings	78.855	2.29
82	Confectionery Products	69.860	2.03
231	Glass Containers	66.417	1.93
139	Veneer and Plywood	64.695	1.88
15	Tobacco	63.533	1.85
	Top 10 Subtotal	2216.177	64.46
	Regional Total	3437.879	100.00

Source: Total exports is the sum of domestic exports and foreign exports provided by the IMPLAN 303B Report.

The results from Table 4.9 help to better define the Southside economy. The same three sectors that ranked the highest in total industry output per Table 4.6 also are the three highest ranked export industries. The order is changed somewhat, with tobacco stemming and redrying as the highest ranked export industry. Whereas these three

sectors account for 28.1 percent of total industry output, they account for 48.19 percent of exports. All but two of the top ten export sectors have 98 percent or higher of their final demand derived from exports. Note that the tobacco sector rounds out the top ten in export sectors. Using these results the export-based definition of dependency would define the tobacco industry, with two sectors in the top ten in absolute exports, as a dependent industry.

Tables 4.10 and 4.11 provide the top ten value added and employment sectors based upon export share of total industry output. In this case the export share is multiplied by the sector's value added or jobs to determine the respective export-related proportion. This perspective changes the original value added and jobs top ten rankings. Four sectors are common to Table 4.10 when compared to Table 4.7 and similarly when Table 4.11 is compared to Table 4.8. These tend to be the larger manufacturing sectors, such as broadwoven fabric mills and finishing, and tobacco stemming and redrying. The new sectors in Tables 4.10 and 4.11 tend to be other manufacturing sectors that replace government-related and service sectors. An interesting result from the export share rankings is that the two tobacco sectors are now both in the top ten for the value added measure. Tobacco stemming and redrying and the tobacco sector are now in the top five for jobs by this ranking. If exports for the tobacco industry decline, then jobs are likely to decline accordingly.

Table 4.10 Southside 1992 Top Ten Sectors for Export Share of Value Added

IMPLAN Sector Number	Sector Name	Total Value Added ($ Millions)	Export Share of Value Added ($ Millions)
108	Broadwoven Fabric Mills and Finishing	265.7200	221.4926
107	Tobacco Stemming And Redrying	183.7382	161.6078
191	Plastics Materials And Resins	147.9928	122.1380
461	Owner-occupied Dwellings	188.3335	56.5001
267	Nonferrous Wire Drawing and Insulating	43.7916	42.6225
124	Apparel Made From Purchased Materials	55.6788	33.0009
231	Glass Containers	32.9229	32.2451
15	Tobacco	57.0441	31.7697
102	Macaroni And Spaghetti	31.3649	29.4578
139	Veneer And Plywood	29.6409	22.4332

Source: Total exports as a percentage of total industry output is found for each sector using information taken from the IMPLAN 303B Report. This percentage is then multiplied against the respective value added total for the sector to find the export share of value added.

Table 4.11 Southside 1992 Top Ten Sectors for Export Share of Employment (Jobs)

IMPLAN Sector Number	Sector Name	Total Employment (Jobs)	Export Share of Jobs
108	Broadwoven Fabric Mills and Finishing	8017	6683
15	Tobacco	5455	3038
124	Apparel Made From Purchased Materials	2806	1663
525	Household Industry-Low Income	2371	1366
107	Tobacco Stemming And Redrying	1442	1268
191	Plastics Materials And Resins	1265	1044
224	Shoes, Except Rubber	967	798
267	Nonferrous Wire Drawing and Insulating	692	674
449	General Merchandise Store	2346	653
116	Yarn Mills And Finishing	1013	623

Source: Total exports as a percentage of total industry output is found for each sector using information taken from the IMPLAN 303B Report. This percentage is then multiplied against the respective jobs total for the sector to find the export share of jobs.

IV.4.2 Sector Interconnectedness

So far, all of the rankings have looked at measures that isolate a sector without examining its effect on other sectors. One way to measure this sector interconnectedness, or sectoral linkages, is to use multipliers[20]. Chapter V will discuss multipliers and their components in detail, as well as IMPLAN's calculation of multipliers. However, two measures will be used for this section of analysis. *Total effects* measure all of the linkage effects for the sector, the sum of the direct, indirect and induced effects. The *type III multiplier* is a ratio of the total effects divided by the indirect effects. The two measures have different multiplicands. Using value added as an example, a million dollar change in final demand for a sector will lead to the total effect in million dollars of value added. On the other hand, the type III multiplier will use value added as the multiplicand. Thus, a million dollar change in value added will lead to the type III multiplier in terms of millions of dollars of value added change.

Many analysts view a multiplier, such as the type III multiplier, as a measure of interconnectedness. While it is true that a higher multiplier within a sector does mean more linkages with other sectors, it is not necessarily true that a higher multiplier means a larger response to a change in final demand. Some sectors may have a higher multiplier because the denominator of the ratio, the direct effect, is smaller[21]. Thus, other analysts prefer to compare or rank sectors using the total effects. Nevertheless, there is sometimes an advantage to ranking by the multiplier. Thus, this analysis will conduct rankings by both the total effects and the type III multiplier.

---

[20]Recall that the concept of backward and forward linkages is introduced in Chapter III. Multipliers can only measure backward linkages.

[21]A good example is the highest ranked type III value added multiplier in Table 4.13. Here the sector for meat packing plants has a multiplier of 43.66, well above all other sectors. In this case the direct effect is very small relative to the indirect and induced effects, causing the high multiplier. The total effect for this sector is lower than all of the sectors in Table 4.12. When asked about the high multiplier for the meat packing sector, an employee at MIG, Inc. said that there is probably extremely high output per worker for this industry. This would explain the relatively small value added direct effect.

Two different measures will be examined in this section: value added and employment. Tables 4.12 and 4.13 provide the top 25 sectors for value added, ranked by total effects and by type III multiplier, respectively. The details are taken from the IMPLAN 605 Report after sorting on the appropriate measure. Tables 4.14 and 4.15 provide the top 25 sectors for employment, ranked by total effects and by type III multiplier. These details are produced from the IMPLAN 606 Report.

The top 25 value added sectors by total effects are provided by Table 4.12. In many of the cases, the sectors are services related, and have growth potential limited by the population of the region. In other words, most of the sectors do not have an export-oriented nature. Two agricultural sectors do appear in the top 25: miscellaneous livestock and tobacco. The tobacco sector makes the top 25 value added sectors, because it has a high induced effect. A separate sort on the induced effect column determined that tobacco has the 13th highest induced effect of all sectors. The high induced effect for tobacco is related to the fact that tobacco production is labor-intensive, and thus provides income to support the consumption driven induced effects. The total effects figure for the tobacco sector is 1.4071. This means that, for a million dollar increase in final demand for tobacco, $1.4071 million in value added is generated throughout the economy. This is a high level of return in the way of regional income generation and indicates that tobacco production has strong linkages to the rest of the economy. Tobacco stemming and redrying did not make the top 25, but the figures for this sector are provided at the bottom of Table 4.12 for comparison. Neither tobacco-related sector made the top 25 type III multiplier sectors for value added (see Table 4.13). The tobacco sector does have a reasonably high Type III value added multiplier due to its large induced effect.

Table 4.12 Southside 1992 Value Added Ranked by Total Effects - Top 25 Sectors

IMPLAN Sector	Sector Name	Direct Effects	Indirect Effects	Induced Effects	Total Effects	Type I Mult.	Type III Mult.
476	Detective and Protective Services	0.9322	0.0168	1.8697	2.8187	1.0180	3.0237
474	Personnel Supply Services	0.9434	0.0187	1.5839	2.5460	1.0198	2.6988
466	Beauty and Barber Shops	0.8067	0.0405	1.1389	1.9862	1.0503	2.4620
472	Services to Buildings	0.7958	0.0403	1.1047	1.9408	1.0506	2.4387
464	Laundry Cleaning and Shoe Repair	0.7730	0.0712	0.9754	1.8196	1.0921	2.3540
489	Membership Sports and Recreation Clubs	0.8288	0.0542	0.8283	1.7114	1.0654	2.0648
504	Labor and Civic Organizations	0.6920	0.0879	0.9053	1.6852	1.1270	2.4352
450	Food Stores	0.8741	0.0420	0.7564	1.6725	1.0481	1.9135
503	Business Associations	0.9289	0.0098	0.6918	1.6305	1.0105	1.7552
485	Bowling Alleys and Pool Halls	0.6247	0.1070	0.8888	1.6205	1.1713	2.5940
491	Nursing and Protective Care	0.8055	0.0545	0.7585	1.6185	1.0677	2.0093
478	Automotive Parking and Car Wash	0.6626	0.0920	0.8608	1.6154	1.1388	2.4381
9	Miscellaneous Livestock	0.7104	0.0310	0.8543	1.5958	1.0437	2.2462
434	Local, Interurban Passenger Transit	0.7964	0.0501	0.6807	1.5271	1.0629	1.9176
25	Commercial Fishing	0.9091	0.0262	0.5861	1.5213	1.0288	1.6734
463	Hotels and Lodging Places	0.8140	0.0581	0.6362	1.5082	1.0714	1.8529
501	Residential Care	0.5800	0.0584	0.8618	1.5001	1.1007	2.5865
509	Research, Development & Testing Services	0.7007	0.0568	0.7367	1.4942	1.0811	2.1325
449	General Merchandise Stores	0.7777	0.0741	0.5999	1.4517	1.0953	1.8667
15	Tobacco	0.5001	0.0974	0.8096	1.4071	1.1948	2.8138
453	Furniture & Home Furnishings Stores	0.8282	0.0572	0.5129	1.3984	1.0691	1.6884
452	Apparel & Accessory Stores	0.6090	0.1295	0.6483	1.3868	1.2127	2.2773
27	Landscape and Horticultural Services	0.6260	0.1248	0.6297	1.3805	1.1994	2.2052
470	Other Business Services	0.7405	0.0583	0.5759	1.3747	1.0787	1.8565
448	Building Materials & Gardening Supplies	0.8333	0.0556	0.4772	1.3661	1.0667	1.6394
---	-----	---	---	---	---	---	---
107	Tobacco Stemming and Redrying	0.2534	0.0995	0.1009	0.4538	1.3927	1.7908

Source: Figures are taken from the IMPLAN 605 Report.

Note: Direct, indirect, induced and total effects represent the million dollar change in value added for a one million dollar change in final demand for the sector. The Type I and Type III multipliers represent the million dollar change for a one million dollar change in value added for the sector.

Table 4.13 Southside 1992 Value Added Ranked by Type III Multiplier - Top 25 Sectors

IMPLAN Sector	Sector Name	Direct Effects	Indirect Effects	Induced Effects	Total Effects	Type I Mult.	Type III Mult.
58	Meat Packing Plants	0.0171	0.3269	0.4047	0.7487	20.0635	43.6610
457	Credit Agencies	0.1032	0.2284	0.4647	0.7962	3.2131	7.7159
505	Religious Organizations	0.1120	0.3154	0.2853	0.7127	3.8170	6.3645
263	Secondary Nonferrous Metals, N.E.C.	0.0606	0.1697	0.1163	0.3466	3.8009	5.7203
264	Copper Rolling and Drawing	0.0673	0.1187	0.1672	0.3533	2.7631	5.2461
420	Games, Toys, and Children's Vehicles	0.1728	0.1112	0.6057	0.8896	1.6433	5.1485
3	Ranch Fed Cattle	0.2538	0.1402	0.7724	1.1664	1.5523	4.5956
483	Motion Pictures	0.1789	0.1705	0.4635	0.8129	1.9532	4.5436
376	Printed Circuit Boards	0.2492	0.1069	0.7544	1.1105	1.4290	4.4563
72	Flour and Other Grain Mill Products	0.0752	0.1379	0.1132	0.3263	2.8334	4.3374
497	Other Educational Services	0.1870	0.1777	0.4196	0.7843	1.9503	4.1942
391	Aircraft and Missile Equip.	0.1542	0.1598	0.3123	0.6263	2.0361	4.0612
6	Sheep, Lambs and Goats	0.2300	0.1257	0.5769	0.9326	1.5467	4.0553
26	Agricultural, Forestry, Fishery Services	0.3057	0.1887	0.7073	1.2017	1.6174	3.9314
98	Prepared Fresh or Frozen Fish or Seafood	0.1175	0.1205	0.1933	0.4313	2.0260	3.6712
59	Sausage and Other Prepared Meats	0.0988	0.0948	0.1569	0.3504	1.9595	3.5481
95	Bottled and Canned Soft Drinks & Water	0.0966	0.1194	0.1229	0.3389	2.2367	3.5093
190	Cyclic Crudes, Int. & Ind. Organic Chemicals	0.1044	0.1284	0.1301	0.3629	2.2292	3.4756
414	Watches, Clocks, and Parts	0.2262	0.1050	0.4248	0.7560	1.4642	3.3425
218	Gaskets, Packing and Sealing Devices	0.2751	0.1442	0.4956	0.9150	1.5243	3.3260
4	Range Fed Cattle	0.4045	0.1192	0.8166	1.3403	1.2946	3.3136
103	Food Preparations, N.E.C.	0.1344	0.1379	0.1697	0.4420	2.0262	3.2895
226	Luggage	0.2846	0.1266	0.4889	0.9001	1.4449	3.1630
404	Instruments to Measure Electricity	0.2358	0.1146	0.3941	0.7445	1.4859	3.1573
468	Misc. Personal Services	0.3149	0.1599	0.5009	0.9757	1.5076	3.0982
---	-----	---	---	---	---	---	---
15	Tobacco	0.5001	0.0974	0.8096	1.4071	1.1948	2.8138
107	Tobacco Stemming and Redrying	0.2534	0.0995	0.1009	0.4538	1.3927	1.7908

Source: Figures are taken from the IMPLAN 605 Report.

Note: Direct, indirect, induced and total effects represent the million dollar change in value added for a one million dollar change in final demand for the sector. The Type I and Type III multipliers represent the million dollar change for a one million dollar change in value added for the sector.

Table 4.14 Southside 1992 Employment (Jobs) Ranked by Total Effects - Top 25 Sectors

IMPLAN Sector	Sector Name	Direct Effects	Indirect Effects	Induced Effects	Total Effects	Type I Mult.	Type III Mult.
476	Detective and Protective Services	117.2946	0.6157	62.6777	180.5880	1.0052	1.5396
474	Personnel Supply Services	99.3014	0.5829	53.0956	152.9799	1.0059	1.5406
466	Beauty and Barber Shops	70.9971	1.0619	38.1776	110.2365	1.0150	1.5527
472	Services to Buildings	68.0148	1.8792	37.0306	106.9245	1.0276	1.5721
464	Laundry, Cleaning and Shoe Repair	58.7864	2.9274	32.6967	94.4105	1.0498	1.6060
504	Labor and Civic Organizations	54.6194	2.6624	30.3485	87.6304	1.0487	1.6044
485	Bowling Alleys and Pool Halls	52.6868	3.5503	29.7950	86.0321	1.0674	1.6329
501	Residential Care	52.9101	1.6149	28.8879	83.4129	1.0305	1.5765
478	Automotive Parking and Car Wash	51.5736	2.8926	28.8568	83.3230	1.0561	1.6156
9	Miscellaneous Livestock	52.9253	1.1281	28.6381	82.6915	1.0213	1.5624
489	Membership Sports and Recreation Clubs	50.8088	1.5996	27.7666	80.1751	1.0315	1.5780
4	Range Fed Cattle	43.9232	7.7469	27.3754	79.0454	1.1764	1.7996
15	Tobacco	47.8190	3.4068	27.1400	78.3659	1.0712	1.6388
3	Ranch Fed Cattle	38.8915	9.9786	25.8919	74.7619	1.2566	1.9223
491	Nursing and Protective Care	46.3075	1.6823	25.4255	73.4153	1.0363	1.5854
450	Food Stores	46.7064	1.1522	25.3560	73.2147	1.0247	1.5675
376	Printed Circuit Boards	44.8087	2.9245	25.2895	73.0227	1.0653	1.6297
509	Research Development & Testing Services	44.3407	2.2729	24.6964	71.3100	1.0513	1.6082
488	Amusement and Recreation Services, N.E.C.	42.5608	3.9234	24.6278	71.1120	1.0922	1.6708
26	Agricultural, Forestry, Fishery Services	40.1327	4.6218	23.7114	68.4659	1.1152	1.7060
503	Business Associations	43.4943	0.2757	23.1898	66.9598	1.0063	1.5395
434	Local, Interurban Passenger Transit	41.1995	1.8674	22.8173	65.8841	1.0453	1.5991
454	Eating and Drinking Estab.	40.3966	1.7786	22.3449	64.5200	1.0440	1.5972
495	Elementary and Secondary Schools	35.5045	6.3046	22.1509	63.9599	1.1776	1.8015
452	Apparel & Accessory Stores	37.4907	3.5297	21.7331	62.7535	1.0941	1.6738
---	-----	---	---	---	---	---	---
107	Tobacco Stemming and Redrying	1.9886	4.639	3.3812	10.0089	3.3328	5.0331

Source: Figures are taken from the IMPLAN 606 Report.

Note: Direct, indirect, induced and total effects represent the jobs created for a one million dollar change in final demand for the sector. The Type I and Type III multipliers represent the total jobs created for a an additional job created in the sector.

Table 4.15 Southside 1992 Employment (Jobs) Ranked by Type III Multiplier - Top 25 Sectors

IMPLAN Sector	Sector Name	Direct Effects	Indirect Effects	Induced Effects	Total Effects	Type I Mult.	Type III Mult.
58	Meat Packing Plants	2.9820	22.8696	13.5655	39.4171	8.6693	13.2185
107	Tobacco Stemming and Redrying	1.9886	4.6390	3.3812	10.0089	3.3328	5.0331
263	Secondary Nonferrous Metals	3.1084	4.5335	3.8986	11.5405	2.4585	3.7127
459	Insurance Carriers	7.7252	8.1183	8.3138	24.1573	2.0509	3.1271
163	Paperboard Mills	3.6867	3.9189	3.8801	11.4856	2.0630	3.1155
5	Cattle Feedlots	9.8346	9.6466	10.2227	29.7039	1.9809	3.0203
505	Religious Organizations	9.2726	8.9509	9.5627	27.7863	1.9653	2.9966
146	Reconstituted Wood Products	5.3593	5.0359	5.3033	15.6985	1.9397	2.9292
201	Gum and Wood Chemicals	4.3844	4.0827	4.3196	12.7866	1.9312	2.9164
443	Electric Services	3.5018	3.2315	3.4351	10.1684	1.9228	2.9037
24	Forestry Products	9.5739	7.6321	9.0288	26.2348	1.7972	2.7402
72	Flour and Other Grain Mill Products	4.1134	3.3220	3.7933	11.2286	1.8076	2.7298
191	Plastics Materials and Resins	2.6646	2.1091	2.4354	7.2090	1.7915	2.7055
139	Veneer and Plywood	7.6390	5.8459	7.0762	20.5612	1.7653	2.6916
134	Sawmills and Planing Mills, General	9.0096	6.8538	8.3243	24.1877	1.7607	2.6847
77	Dog, Cat, and Other Pet Food	2.9848	2.2502	2.6708	7.9058	1.7539	2.6487
360	Electrical Industrial Apparatus, N.E.C.	4.6084	3.3883	4.0797	12.0765	1.7352	2.6205
60	Poultry Processing	7.7014	5.5301	6.9432	20.1748	1.7181	2.6196
119	Coated Fabrics, Not Rubberized	6.8164	4.7735	6.0817	17.6716	1.7003	2.5925
50	New Utility Structures	5.5479	3.9181	4.8293	14.2953	1.7062	2.5767
198	Surface Active Agents	2.5798	1.7992	2.2340	6.6129	1.6974	2.5634
22	Forest Products	6.1521	4.2082	5.2855	15.6457	1.6840	2.5432
483	Motion Pictures	17.9517	11.6565	15.5368	45.1449	1.6493	2.5148
442	Radio and TV Broadcasting	11.6297	7.4275	10.0002	29.0574	1.6387	2.4985
140	Structural Wood Members, N.E.C.	11.2921	7.1701	9.6879	28.1501	1.6350	2.4929
---	-----	---	---	---	---	---	---
15	Tobacco	47.819	3.4068	27.14	78.3659	1.0712	1.6388

Source: Figures are taken from the IMPLAN 606 Report.

Note: Direct, indirect, induced and total effects represent the jobs created for a one million dollar change in final demand for the sector. The Type I and Type III multipliers represent the total jobs created for a an additional job created in the sector.

When looking at total effects for jobs (see Table 4.14), the tobacco sector again resides in the top 25 sectors. Tobacco generates approximately 78 jobs for every million dollar change in final demand. Tobacco stemming and redrying does not reside in the top 25 total effects for jobs, but interestingly, is the second highest ranked sector for jobs based on the type III multiplier (see Table 4.15). The type III multiplier for tobacco stemming and redrying of 5.0331 means that for every job created by the tobacco stemming and redrying sector, a total of five jobs are created in the regional economy. Because tobacco is a significant input, it is likely that some of these jobs are created in the tobacco production sector.

A number of conclusions can be drawn from the analysis in this section. First, while there is some diversity in the regional economy, there is also a high level of dependency on a number of sectors. Of interest to this study is the fact that the Southside region has a significant dependency on the tobacco industry due to its size and level of exports. A second conclusion is that today's tobacco economy is not the same as the tobacco economy of the past described by Frederick Siegel[22]. Economic measures of a sector's linkages with the rest of the economy indicate that the tobacco production sector has one of the highest levels of linkages[23]. This means that the rest of the regional economy is ever more dependent on the tobacco industry for its current level of activity. Thus, it is important to understand what these linkages are, in order to better understand who may be affected by any change to the tobacco industry.

---

[22]Recall that Chapter III reviews Frederick F. Siegel's perspective on tobacco's relationship to the history of development in Danville and Pittsylvania County. His critical assessment notes the division in the benefits accruing to the region between the rural tobacco producing areas and manufacturing based urban areas. Siegel's historical analysis claims that tobacco production in the Southside region did not have strong backward and forward linkages. In contrast, Siegel notes that tobacco manufacturing provided a base, or funding, for the support of other industrial development.

[23]Linkages referred to here are backward linkages. Forward linkages are also likely to be strong, but are not measured by the economic measures used in this section.

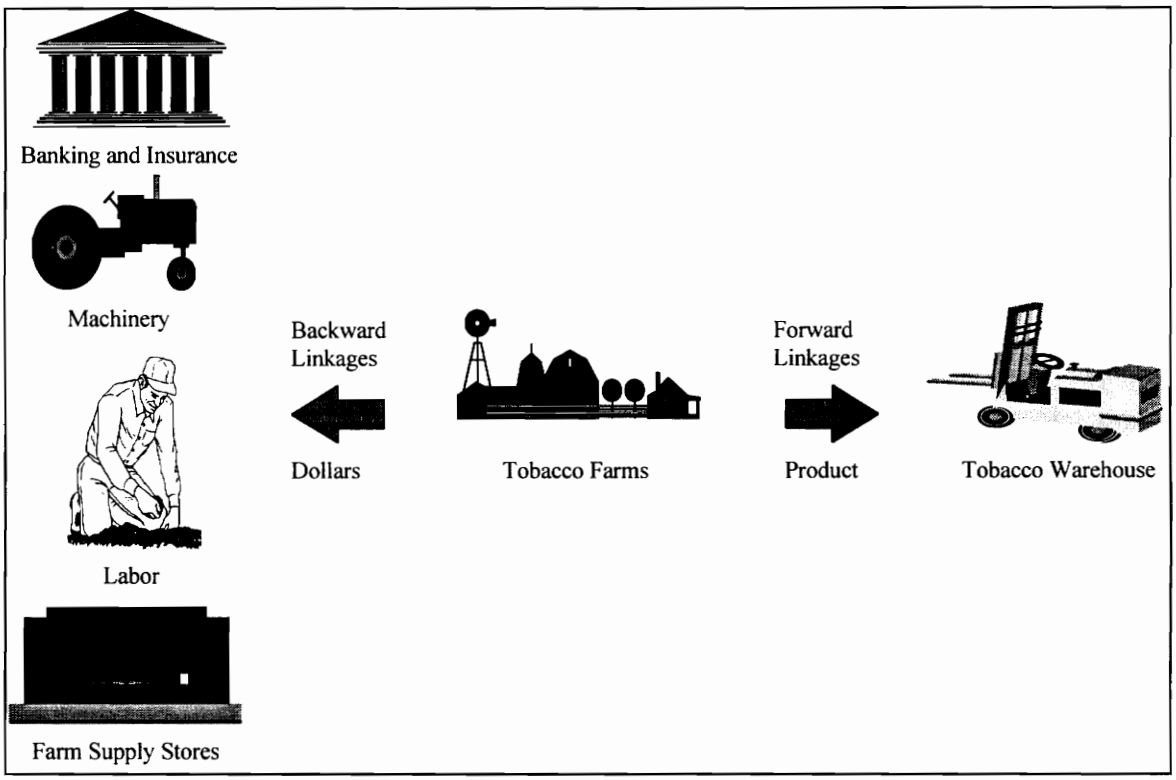
IV.5 A Focus on Tobacco

Previous chapters, as well as sections of this chapter, have provided substantial information on tobacco, some of it specific to the Southside region, but much of it general to the industry. This section seeks to enhance understanding of the industry and its role in the Southside region in order to set up further work in Chapter VI. The best way to begin is by examining tobacco trade patterns.

IV.5.1 Tobacco Trade Patterns

The purpose of this section is to trace the path that tobacco takes from the time it is a seed in the ground until is displayed on a shelf in a retail store[24]. A previous section in this chapter noted that there is a high degree of backward linkages in the tobacco industry. This section will examine these linkages, first from the standpoint of the tobacco producer. Figure 4.5 illustrates some of these linkages for a tobacco producer. A number of inputs are required for tobacco production. Suppliers of these inputs are referred to as backward-linked industries. In the case of tobacco, many of the backward-linked industries are agribusinesses. These include farm supply stores, farm equipment dealers, insurance and financial service institutions, and labor contractors.

[24]As will be shown, the 'seed in the ground' is a metaphor: tobacco seeds are not planted directly in the field.



Note: Not all of the forward linkages are shown. See Figure 4.6 for a more complete schematic of these linkages.

Figure 4.5 Tobacco Production Backward and Forward Linkages

After the tobacco leaf leaves the farm gate, there are a number of forward-linked industries involved in the process that culminates with the consumer purchase of the tobacco product at a retail outlet. These forward-linked industries perform further processing on the tobacco commodity, thereby increasing its value and changing its next intended use. Examples in the case of tobacco include transport industries, warehouses used to assemble and auction tobacco, tobacco stemming and redrying operators, final product manufacturers such as cigarette manufacturers, and the wholesalers and retailers who distribute the final product. Figure 4.6 displays a schematic that shows the chain of these linkages, or tobacco trade patterns. Note that not all of the linkages are shown explicitly in Figure 4.6[25].

[25]For example, wholesalers and retailers are a link in the chain between cigarette manufacturers and consumers that would be shown in a more detailed schematic.

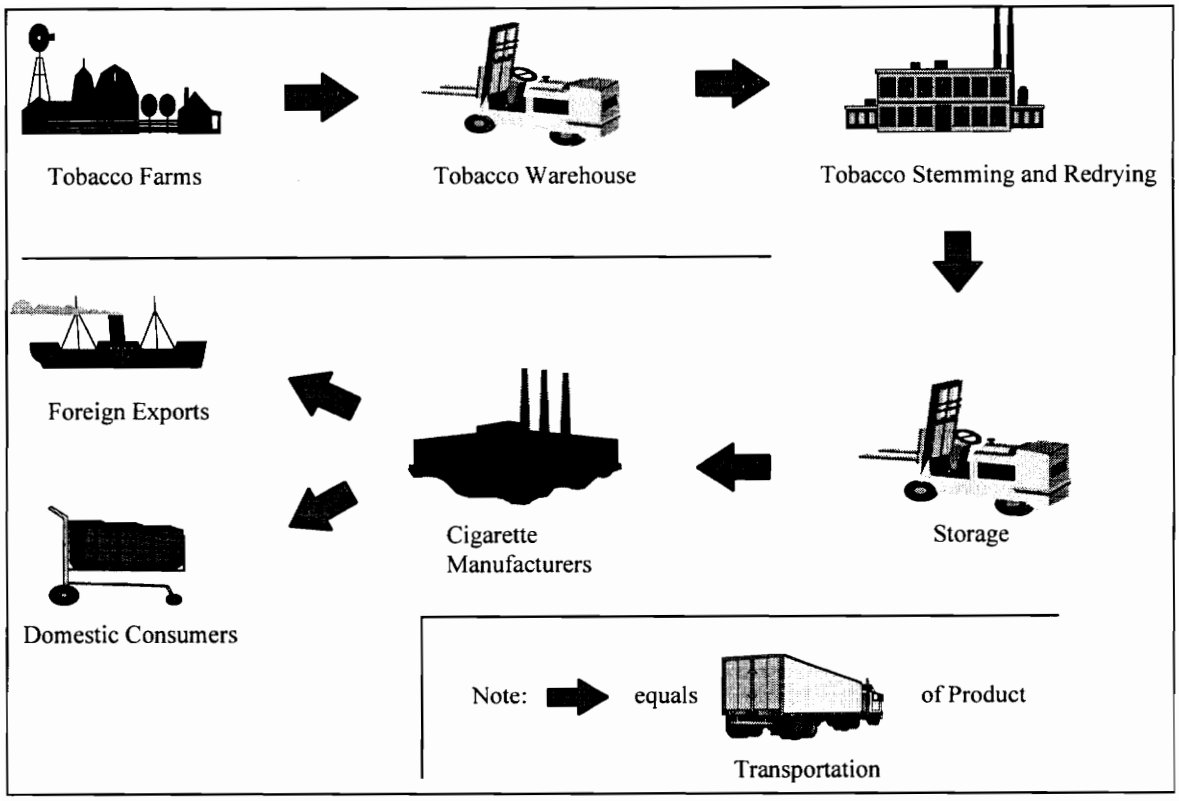


Figure 4.6 Simplified Tobacco Industry Schematic of Forward Linkages

The basic trade pattern is from the tobacco producer, to the warehouse, to the stemming and redrying operator, to the final product manufacturer, and finally, to the wholesaler and retailer. There are a number of variations on the pattern, particularly when the product is exported at various unfinished stages. The first three links of this chain will be looked at in more detail. Section IV.5.2 will look at tobacco production. Tobacco warehouses, the second link, are examined in Section IV.5.3. Section IV.5.4 looks at the third link, tobacco stemming and redrying operations. Finally, Section IV.5.5 briefly discusses the remaining links.

IV.5.2 Tobacco Producers

There are a number of ways to measure the contribution and significance of tobacco production to Southside Virginia. Table 3.1 provides 1993 tobacco production statistics (in pounds) by county for the Southside *study region* and in comparison to Virginia totals. A descriptor constructed in Chapter III shows that the Southside counties rank the highest of all counties in Virginia with respect to tobacco sales in proportion to household income. Both of these are intended to indicate the importance of tobacco to the Southside counties relative to other Virginia tobacco-producing counties. The tobacco sales as a percentage of household income descriptor in Table 3.3 begins to address the importance of tobacco to the county as a whole, but other measures are needed. One place to start is to examine how important a component of agriculture tobacco is for the Southside *study region.*

IV.5.2.1 Tobacco Producers' Share of Southside and Virginia Agriculture

Table 4.16 indicates how very important tobacco is to the farm sector for the counties of the Southside *study region.* The statistics collected in 1992 for farms with over $10,000 in sales shows that 80 percent of the farms in the region grow tobacco and 68 percent of their agricultural sales are from tobacco. Total tobacco sales for the Southside *study region* are $106,699,000. Halifax is the high county and Charlotte the low county for both the number of farms and sales statistics. The table also provides comparative statistics with the Commonwealth. The region contains almost 38 percent of Virginia's tobacco farms and 65 percent of tobacco sales. These statistics are skewed this way because burley farms located in the southwest of the Commonwealth tend to be smaller tobacco farms. A final observation is that the region's tobacco sales are almost eight percent of Virginia's total farm sales.

Table 4.16 Regional and State Comparison of Tobacco Farms and All Farms, for those Farms with Sales Over $10,000

County	1992 Tobacco Farms	1992 Total Farms	%	1992 Tobacco Sales ($)	1992 Farm Sales ($)	%
Brunswick	128	170	75.29	8,994,000	15,181,000	59.25
Charlotte	136	198	68.69	7,298,000	13,588,000	53.71
Halifax	483	550	87.82	24,878,000	31,421,000	79.18
Lunenburg	102	138	73.91	8,267,000	12,418,000	66.57
Mecklenburg	253	318	79.56	18,683,000	30,646,000	60.96
Pittsylvania	538	676	79.59	38,579,000	53,450,000	72.18
Region Total	1,640	2,050	80.00	106,699,000	156,704,000	68.09
Virginia	4,358	16,828	25.90	164,130,000	1,964,325,000	8.36
Region / VA	37.63%	12.18%		65.01%	7.98%	

Source: Table 12 - Farms with Sales of $10,000 or More, *1992 Census of Agriculture*, pp. 343-352

In order to complete the picture, tobacco farms with sales under $10,000 should not be excluded. It should be noted that these farms account for over 23 percent of the tobacco farms, but just over 2 percent of tobacco sales. There were 501 of these farms in 1992, with total tobacco sales of $668,000, yielding an average of $1,333 in sales per farm. While significant statistically in number of farms and perhaps to the budgets of the individuals involved, these small tobacco farms are relatively insignificant to regional income generation[26].

IV.5.2.2 Tobacco Producers' Share of Southside Industry

Tobacco producers account for 1.64 percent of the Southside *study region* total industry output, 1.72 percent of value added and 5.28 percent of jobs. For further analysis, refer back to Sections IV.3 and IV.4.

[26]It is also likely that these smaller farms are the most endangered of all of the tobacco farms. There is an on-going consolidation of tobacco farms in the nation, that most likely disproportionately involves these smaller farms that usually have more difficulty competing due to their lower economies of size.

IV.5.2.3 About Tobacco Producers

So far, this discussion only looks at statistics that portray the importance of the production efforts of Southside tobacco farmers. What is needed is more information about who these producers are. Purcell draws some conclusions by extracting findings for 110 farmers in flue-cured producing counties out of a larger 1988 sample survey of Virginia farms[27]. Of these 110 farmers, 56 produced tobacco (Purcell, p. 28). The education level for the tobacco farmers averages 10.39 years, lower than the 12.31 years for non-tobacco farmers. Their respective average age is 56 and 54 years. Purcell points out that averages can be deceiving, because over 15 percent of the flue-cured farmers also have some college education, and 7 percent are college graduates. The college-educated group tends to be younger farmers, while flue-cured farmers with more limited education tend to be older (p. 25). Average total family income is comparable for both groups, $31,924 for tobacco farmers and $34,510 for non-tobacco farmers. However, tobacco farmers have twice as much farm income on average, $18,004 versus $9,314. To equalize total family income, the non-tobacco farmers have nearly twice as much wage and self-employment income[28] (p. 24 and 28). Two different conclusions are drawn from these results: younger flue-cured tobacco farmers may be more capable of adopting new production practices encouraged by policy and other changes, and the lower level of education of flue-cured tobacco farmers on average than non-tobacco farmers would probably make the flue-cured tobacco farmers less competitive in a search for alternative employment opportunities requiring higher education levels (p. 25 and 30).

Some of these findings from the 1988 survey are likely to have changed somewhat, as some of the older, and generally less educated, tobacco farmers are likely to have retired

[27]The survey is conducted by Alwang and Stallmann, Department of Agricultural and Applied Economics, Virginia Tech.

[28]Clauson and Grise note that off-farm income is becoming less important to flue-cured farms, coinciding with larger farms generating more income, although an exception exists for younger farmers who rely more on off-farm income (p. 13).

from producing tobacco. However, the findings agree with some of the results of a national study that uses 1991 (and prior years) survey data. *Flue-cured Tobacco Farming: Two Decades of Change* reports on facets of the structural change in the industry (Clauson and Grise). It observes that "flue-cured tobacco farms have become larger and more efficient during the last two decades", and proceeds to explain how and why this is happening (Clauson and Grise, p. v). One reason noted earlier, is that legislative changes allowing quota sales have encouraged larger farms. Statistics for this national study are divided into four regions. One of these, the Piedmont of North Carolina and Virginia, encompasses the Southside *study region*, but approximately doubles it by adding bordering North Carolina counties. This will alter the results applicable to Southside Virginia to the extent the North Carolina area differs.

While flue-cured farms have become larger and more efficient nationally, it does not mean that the scale is the same across regions. Statistics indicated that in 1991, Piedmont flue-cured tobacco farms have more farms producing fewer than 9 acres (31 percent) and less farms producing over 35 acres (24 percent) than other regions[29] (Clauson and Grise, p. 4). Not surprisingly, Piedmont farms require more hours of harvest labor on average than the other regions (p. 26). Piedmont farms also have less capacity to increase tobacco production on currently owned or rented land by substituting tobacco for other crops[30] (p. 3). All of this does not bode well for the Southside *study region* in the event that the quota restrictions are lifted (quota is allowed to move across county borders) and if size efficiency is a competitive reaction.

---

[29]Similar statistics for 1972 indicate the structural shift to larger farms. Farms producing fewer than nine acres constituted seventy-one percent of the total farms in 1972, while farm producing over thirty-five acres are only one percent of the total (Clauson and Grise, p. 4)

[30]The capacity conclusion is the author's, while the reference refers to the source material indicating Piedmont farms on average have less land used in the production of non-tobacco commodities than other regions.

IV.5.2.4 Tobacco Production Process and Input Use

Up to now discussion has centered on information about tobacco producers and the relative size and importance of their harvest. A description of the actual production process, including methods of production and inputs used, will complete the picture. Some of the general description that follows is obtained from the Virginia Cooperative Extension's annual *Flue-cured Tobacco Production Guide*. The focus of this guide is on some of the input choices producers must make (other than labor versus mechanization issues).

This discussion will break tobacco production into four stages: seedling preparation, preharvest practices, harvest and curing. The first stage involves raising the tobacco seedlings either in outdoor plant beds or greenhouses. In 1994, more than 33 percent of Virginia flue-cured tobacco seedlings were raised in greenhouses (Reed, et al, p. 26). Inputs required for raising seedlings depends on the process used, particularly now that the plant float system is being used. Invariably, fertilizer, chemicals and labor are some of the inputs required.

Tobacco seedlings are transplanted to the field. Care for the plant from this point up to harvest is the preharvest, or second, stage. Prior to transplanting the seedlings, the field must be properly prepared. This may include previous crop rotations and cover crops. Inputs during the preharvest stage will include plowing, fertilizer, possibly irrigation, chemicals for disease control, herbicides for weed control, and insecticides for insect control. Labor is involved in application of all of these inputs. The requirements for two other procedures during this time will vary depending on whether 'nonflowering' or flowering varieties of tobacco are grown[31]. In general these two procedures, sucker control and 'topping' (removal of the flower), require labor inputs. There is also a chemical input that reduces sucker growth. A final elective input prior to harvest is an

[31]Most producers still plant the flowering variety of tobacco.

application of a chemical preparation that starts the process of 'yellowing' the leaves in the field.

Harvest is the third stage. Unlike many commodities, the entire plant is not usually harvested at one time. Instead, leaves are harvested as they mature, starting from the base of the plant. Clauson and Grise use five categories to classify harvest methods: walking primers, riding primers, one-row mechanical harvester, two-row mechanical harvester and once-over mechanical harvester (p. 22). These methods reflect the continuum from an all-labor to a completely mechanized process[32]. Mechanization requires an initial capital investment and recurring operating and maintenance costs. The harvest stage also includes preparation of the leaves for curing. Clauson and Grise categorize leaf preparation by six methods: hand loop on sticks in field or barn, machine tie on sticks in field or at barn, bulk rack at barn, bulk rack in field, fill big boxes at barn, and fill big boxes in field (p. 22).

Curing is the last stage, the process that brings the leaf its distinctive golden color. Tobacco placed on sticks is usually cured in conventional barns (wooden structures), while tobacco on racks or in boxes is usually cured in bulk barns (steel containers) (Clauson and Grise, p. 21). Curing involves a period of time where the tobacco is placed in a temperature and humidity controlled environment. This requires large amounts of fuel. Three thousand pounds of tobacco typically requires 225 gallons of fuel oil or 225 gallons of L.P. gas in the curing process (Reed, et al., p. 89).

As can be seen from this description, there are a wide range of possibilities in the methods and inputs used in tobacco production. Labor requirements vary widely. Clauson and Grise provide a variety of labor statistics segregating preharvest and harvest, and showing variation by region, acreage and harvest methods. Average preharvest labor

[32]Most Southside producers still use an exclusively manual harvest method.

hours per acre for all farms is 33.9 and for harvest, 85 hours (Clauson and Grise, p. 19 and 25). The Piedmont region exceeds both averages at 36.6 and 103 hours (p. 18 and p. 24). Differences in methods mean each operation will incur different expenditures and returns. However, a typical budget for Virginia is prepared by the Central District Farm Management division of the Virginia Cooperative Extension. Table 4.17 provides this budget.

The expenditures in Table 4.17 generally correspond to the inputs explained in the previous production process narrative. The various expenditures in the budget begin to demonstrate the number of different suppliers that sell or manufacture the inputs. Rather than attempting to quantify these linkages here, the IMPLAN model will be used for this purpose in Chapter VI.

Since Table 4.17 is only a typical budget, the Central District Farm Management also provides other production options to assist producers in creating their own budget. For example, the example budget shows that seedlings are raised in a plant bed. There are less expensive plant bed options suggested, or if greenhouse grown plants are the preference, the plant bed budget section is higher at $62.78 per acre. Similar treatment options exist for fertilizer and chemicals, and different harvest and curing methods. Note that the budget assumes that some of the labor is provided by the producer. The producer's 'pay' is the management portion of the budget total for returns to land (quota), overhead and management section. This return to the producer depends on the price ultimately received for the tobacco.

There are other important components in the returns to land (quota), overhead and management budget line besides producer's 'pay'. While the operating costs portion of the budget is a variable cost dependent on the amount of production, *overhead* in this budget covers an allocation of fixed costs other than the machinery and equipment fixed

Table 4.17 Virginia Flue-cured Tobacco Budget per Acre, for a Farm of Approximately 50 Acres in Size

Plant Bed:	
Tobacco Seed	$ 7.08
Fumigant	17.48
Plastic Cover	7.65
Remay Cover	10.32
Straw	1.00
12-6-6	5.79
16-0-0	0.47
Fungicide	0.59
Insecticide	0.65
Subtotal : Plant Bed	$ 51.03
Field:	
Lime	$ 14.06
PPI: Herbicide	4.38
PPI: Fungicide	42.72
PPI: Nematicide	173.62
FRow Fertilizer (6-12-18)	82.62
TPW : Insecticide	10.15
Sidedress (15-0-14)	20.55
Insecticide	26.26
Sucker Control	57.77
Federal Crop and Hail Insurance	168.00
Cover Crop : Rye Seed	14.00
Tobacco Curing Fuel	165.38
Building Insurance and Electric	32.50
Marketing Charges	169.50
Tractor, Equipment, Fuel and Repairs	375.49
Hired Labor	884.40
Subtotal Field	$2241.40
Annual Operating Capital	$ 69.30

TOTAL OPERATING COSTS	$2361.73
MACHINERY AND EQUIPMENT FIXED COSTS	743.09
RETURNS TO LAND (QUOTA), OVERHEAD AND MANAGEMENT	1220.18

EXPECTED CASH RECEIPTS	$4325.00

This budget assumes a yield of 2,500 pounds of tobacco. Expected cash receipts are based upon an average price of $1.73 per pound.

Note: A few rows of the original budget are combined and others are reordered in this presentation.

costs that are broken out separately. Obviously land is a required input to the process, and all land has alternative uses or can be sold. Thus, the returns on land component of the budget line item should reflect the possible returns from these alternative uses of the land or the land rent paid if land is not owned.

IV.5.2.5 Flue-cured Quota Rights

As noted in Chapter II, the availability of land does not mean that tobacco can be produced and marketed. *Quota rights* are also required. Important to the tobacco production market structure is the fact these quota rights can be transferred in a rental arrangement. In the Piedmont region in 1991, only 13 percent of the producers owned all of the quota rights they used for production and marketing. At the other end of the spectrum, only nine percent rented all of their quota rights. This leaves the majority, or 79 percent of the producers, as both owners and renters of quota rights (Clauson and Grise, p. 8). A CFSA County Director for one of the counties in the Southside *study region* estimated that approximately 30 percent of all quota rights are rented. He believes this number is falling, because producers are still buying quota in lieu of renting when they can. Because of the prevalence of quota renting, it is important to determine how this component of the returns to land (quota), overhead and management budget line item is valued.

Babcock and Foster outline the basic theory of *quota rent* determination. The environment that exists for the theory they present is one where there is mandatory supply control over a commodity by quota production and marketing rights. These quota rights can be transferred, presumably for a lease or rental rate paid by the producer to the owner of the quota rights. Under neoclassical model assumptions, the quota rental rate is established similar to an unconstrained supply environment, where the producer sets production levels at the quantity where marginal cost equals the market price. Quota rentals are just another marginal cost, so the rate that should be paid for quota "is equal to

the difference between the expected market price and the marginal cost of production" (Babcock and Foster, p. 631).

The flue-cured tobacco quota program does not operate under an identical policy environment to the situation above; the neoclassical model assumptions are strained. One policy variation is that the quota rights have restricted transferability. As Chapter II indicates, the quota rights are transferable only within the same county. In many counties this condition is likely to strain the neoclassical assumption of competitive markets due to the reduced size and number of transactions in the market. A second policy variation is that there are three different forms under which flue-cured quota can be transferred. The first of these is the sale of quota separate from the land, which is different than the quota rental condition. The other two contain quota rental arrangements, but different restrictions on where the production can take place. The simplest of these is when tobacco is grown on the farm where the quota is established. In this situation there is not only a quota rental, but also a land rental fee that will be paid. The second situation is where *quota tracts*, as the quota ownership allotments are referred to, are combined under certain rules into a single farm[33]. This is still a rental arrangement, but one where the production does not have to occur on the farm the quota is allotted to as long as certain guidelines are met. Potentially only a rental payment may be paid under this form of quota transfer, but many variations exist[34]. Thus, while the tobacco quota rental valuation

[33]A Southside CFSA county director estimated that approximately sixty percent of the tobacco operations run under these farm combination rules. However, it is also common for a tobacco producer to work more than one farm. In one county a few producers may work as many as fifteen to twenty farms, while it is common for producers to work several farms.

[34]A Southside county extension agent believes that the most common quota rental situation includes land rental. The most common situation usually includes contract terms for multi-purpose use of the land. That is, the leased land is used for other purposes in addition to tobacco production. There are a number of reasons for multi-purpose use of rental land besides a farmer's desire to diversify his/her production. USDA tobacco production rules require a certain set-aside of open acres for each tobacco acre under production. Farm combination rules also have rotation requirements. These rules encourage multi-purpose use of the leased land. Because of multi-purpose rental arrangements, many other factors may enter into the lease terms. For example, terms for whether the corn or wheat base check goes to the producer or land owner has to be decided where this situation exists. Other additional terms often go into the quota rental arrangement as well that will increase the total rental rate. The land owner may provide use of an irrigation

may conform to theory, the policy and environmental variation present make it more difficult to measure[35].

The most recent published numbers on quota rental rates are for 1991[36]. The quota rental rate for the Piedmont region is 29.4 cents per pound (Clauson and Grise, p. 10). This average is "weighted by pounds of quota rented per farm" (p. 9). The average yield per acre for these same Piedmont farms is 2,171 pounds of flue-cured tobacco (p. 5). This means that on average, a $638.27 quota rental is paid per acre. Several Southside county extension agents are surveyed to obtain their estimate of the current, 1996, quota rental rate. There is some variation found within counties, ranging from 25 cents per pound to 45 cents per pound. Based on average estimates and county production levels, a Southside average quota rental rate of 35 cents per pound is estimated. If this average quota rental rate is used in conjunction with the crop budget in Table 4.17, the remaining return for overhead and management per acre is $875.

This 35 cents per pound quota rental rate estimate appears reasonable when compared to the 1991 published rate for the Piedmont region, after considering inflation and other factors. One Southside county extension agent noted that the quota rental rate has not varied much since 1992, further supporting the recent estimate. This same agent cautions that it is difficult to estimate an equivalent per acre quota rental rate. His per pound quota rental rate estimates included land rental. He notes the variability in land productivity and also the different options under the lease noted in an earlier footnote. Also complicating this estimate is the three acres of land set-aside required for each acre of

---

system or bulk barn, may take the risk in the crop so as to qualify for any insurance proceeds, or may even pay for inputs such as fertilizer and curing fuel.

[35]Yet another variation is found in the form of the rental payment. The quota and land rental may be paid in either cash or *share* rents. Share rents are where the quota owner is paid with a predetermined percentage of the proceeds from the tobacco sold under the quota allocation.

[36]The source is the 1991 Farm Costs and Returns Survey conducted by the U.S. Department of Agriculture's National Agricultural Statistics Service and Economic Research Service (Clauson and Grise, p. 1).

tobacco production. However, the land portion of any quota rental is not so significant as to reduce the effectiveness of a general estimate made using this quota rental average. While land rental rates can vary widely, for this particular county in the Southside, pasture acreage runs approximately $12 to $15 per acre, and crop acreage averages $20. Using the higher crop acreage rental rate of $20 per acre and four acres of land rented to produce one acre of tobacco, then $80 of land rental may be present in the $638 quota rental per acre calculated in the paragraph above. For these figures, the land rental is less than 13 percent of the quota rental. This is believed to be a conservative estimate and that the land rental is a smaller proportion. For purposes of this study then, a distinction for the land rental portion of the quota rental rate will not be made. Estimates that are made using the IMPLAN model will work on a per pound of production basis, however, in order to improve the accuracy of the estimates made with regard to the quota rental rates.

A consideration in this study is how the quota rental ownership and proceeds are perceived and used by the quota owners. Some quota owners may be treating their ownership as an investment that is evaluated against other forms of investment. The quota investors will either reinvest the proceeds or spend it. However, it is believed that many quota owners treat it more as an inheritance, without evaluating it against other forms of investment. These owners most likely rely on the quota rental as just another form of income available for consumption[37]. Then there are the quota owners that actually produce tobacco. For these producers the quota return is buried in their return on production. This study will assume that in all three cases, the quota rental income will be used for consumer expenditures. Any debt service payments will be met by this assumption only to the extent that debt service in the typical consumer expenditure pattern provides coverage.

[37]A Southside extension agent reports that the quota income is important to quite a few senior citizens who own the quota. He also noted that for some quota owners, it pays the taxes on the land.

IV.5.2.6 Absentee Quota Owners

An issue arises that is made possible by transferable quota rights: *absentee ownership.* Social scientists study and debate absentee ownership, particularly the decision-making impact of spatial separation of the owners from the property they own. Isard explains

> *not only are the profits of their operations too often drained out of the region, but the social apathy and low local visibility of absentee owners frequently lead to important decisions that do not properly take into account impacts on the local human, social-cultural environment, and local sensitivities* (1975, p. 46).

While Isard is referring to the more common situation of absentee industrial or land owners, the tobacco quota situation brings its own concerns.

Flue-cured quota rules, particularly the fact that ownership and rights have to remain within the county of origin, can be seen as an intention to keep the benefits of the government-granted privilege within the region. However, the presence of absentee quota owners means that the benefits accruing from this privilege are leaving the region and being spent elsewhere. Concerns about this in the past led to changes in the tobacco program that allowed quota sales. One Consolidated Farm Services Agency (CFSA) employee believes the policy change has the intended effect of reducing the level of absentee ownership. However, concerns remain. This same CFSA employee reports that the latest farm bill signed into law contains a provision requiring out-of-state peanut quota owners to either have a stake in the production of peanuts (share rent) or sell their quota rights. It is possible that similar legislation could be considered for tobacco in the future. Because of these policy concerns, this study attempts to estimate absentee flue-cured quota ownership for the Southside *study region.*

In order to estimate the absentee flue-cured ownership for the Southside *study region*, reports of current quota ownership are obtained from each of the six CFSA county offices in the region. Appendix 1.1 gives an example of one page from these reports. Seven columns of information are provided on these reports: farm number, tract number, basic

quota, effective quota, contribution percentage, city name and state. Notably absent are the quota owner name and zip code, purposely done in order to preserve confidentiality as required by law. The report is sorted first by farm number and then within farm number by tract number[38]. Multiple tract farms occur for several reasons. The most common reason is due to the farm combination policy alternative. Another reason, that applies particularly to those farms with a lower farm number in each county (older farms), has existed from the start of the program. In this case multiple tracts under a farm operation were created when tobacco-producing parcels were not physically adjoining. Most important though, each tract number represents a quota right. The contribution percentage associated with each tract indicates the proportion of the pounds of quota that belong to the tract.

Further complicating the situation is the fact that the quota rights for a tract may be owned by more than one individual. Thus, the same tract number may be listed more than one time. When tract numbers are listed more than one time, all of the information may be the same, or only the address may differ. A hypothetical example illustrates the situation. One of the original quota owners dies and leaves ownership to his three children. Two of the children remain in the area, while a third moves out of the area or even out-of-state. In this case, there would be three listings under the same tract number and only the address will differ on one of the three listings. Given the length of time the tobacco program has been in existence and the fact that quota can now be sold, an endless number of examples could be conceived.

One limitation of the CFSA records is that they do not maintain the ownership share of each of the owners listed on a tract. A critical assumption in this study's estimate of absentee ownership is that the ownership share for each owner listed under a tract is

[38]A Southside CFSA county director said they try to retain the tract number from the original assignment of the quota right. However, if the land a tract pertains to is divided by a sale of the land, then new tract numbers are created.

equal. Outwardly this may appear to be a reasonable assumption, assuming on average that imbalances will even out. However, there may be reasons to believe that owners that no longer live in the region may have smaller shares than the owners that remain in the area. For example, a quota owner may bequeath more to the child that is remaining to continue to farm the land. Nevertheless, equal share ownership proportions is the assumption that is made in calculating ownership for this estimate. Another assumption is that the CFSA files are up-to-date on address changes of the quota owners and that the address reflects the residential address of the owner.

Unfortunately, these data could only be obtained in paper form; it was not possible to obtain the data on a diskette. Thus, in order to obtain the information desired, much of these data had to be entered into a spreadsheet. Appendix 1.2 provides the comparable example page of the data entered for the original page found in Appendix 1.1. The calculation of absentee ownership required a number of steps. Appendix 1.3 formally lays out these calculations. An important step is the compilation of a mailing address listing of cities and towns in the Southside *study region*. Note that the definition of absentee is any city or town not on this list. Out-of-state absentee owners are a subset of absentee owners and are those that reside in a state other than Virginia, or in Washington, DC. The first definition of absentee hinges on the definition of the Southside *study region*. A larger region surrounding the Southside region would reduce the absentee ownership. For example, some of the quota owners in Brunswick County have the city of Emporia, located in bordering Greensville County, as an address. These are defined as absentee quota owners. Because this definition of absentee is debatable, the wider out-of-state definition is also prepared for interpretation of the results.

Table 4.18 provides summary information from the reports prepared for each county. It indicates that absentee individuals are estimated to own 6,822,370 pounds of quota. This represents 11.3 percent of the total basic quota for the *study region*. The out-of-state

portion is 2,521,934 pounds of quota, or 4.2 percent of the regional total. These statistics will be used in Chapter VI, in conjunction with input-output analysis, in order to estimate regional economic losses from absentee ownership.

Several additional findings from this work can be reported. Table 4.18 indicates some variability in absentee ownership by county does exist, but no pattern in this variability is identified. Not noted in the table are some additional statistics that were prepared for some of the counties. According to the report prepared, Brunswick County has 361 farms[39]. These farms are divided into 1139 tracts. These tracts are further divided into 2308 ownership shares. There are 857 absentee shares and 510 out-of-state shares, or 37.1 percent and 22.1 percent of total shares, respectively. This is higher than the Brunswick County absentee and out-of-state quota ownership proportions of 19.2 percent and 6.6 percent. A comparison of these figures indicates that Brunswick County absentee owners tend to have smaller quota holdings. This pattern was observed to hold for the other counties as well.

Table 4.18 Tobacco Quota Ownership Information for the Southside *Study Region*

County	Basic Quota (Pounds)	Absentee Share (Pounds)	Absentee Percentage (%)	Out-of-State Share (Pounds)	Out-of-State Percentage (%)
Brunswick	5,549,558	1,068,268	19.2	368,848	6.6
Charlotte	3,578,382	513,763	14.4	40,401	1.1
Halifax	15,482,407	1,912,359	12.4	806,923	5.2
Lunenburg	4,851,542	460,294	9.5	198,136	4.1
Mecklenburg	10,744,946	1,152,227	10.7	545,454	5.1
Pittsylvania	20,211,193	1,715,459	8.5	562,172	2.8
Total	60,418,028	6,822,370	11.3	2,521,934	4.2

Note: 'Absentee Share' refers to those quota owners that reside outside of the *study region*.

[39]Farms in this instance, are those units maintained on CFSA records.

IV.5.3 Marketing Tobacco at Warehouses

The region's national significance in tobacco lore, particularly with regard to marketing tobacco, is without debate. A centennial report for the Danville Tobacco Association Incorporated calls Danville the "World's Best Tobacco Market". Besides founding the "Danville System" tobacco auction system, the Danville market has sold 4,489,237,973 pounds of tobacco in the 99 years up to 1969 (Danville Tobacco Association, p. 54). Approximately another one billion pounds have been sold since 1969. While some booster spirit may be involved in claiming the world's best tobacco market, Danville and the greater Southside region clearly have been regionally significant to the tobacco trade for a long time. Over 40 million pounds of tobacco are sold annually on the Danville tobacco market as long ago as 1885, not much different than sales today (p. 49). This section examines the regional tobacco marketing process.

After all the hard work and expense involved in producing tobacco, tobacco producers are usually eager to market their crop as quickly as possibly. Of course some producers may hold back some of their production from immediate sale if they have expectations of a higher price later in the *marketing season*. However, the producer will want to sell his quota allotment before the marketing season is over. The marketing season for flue-cured tobacco in the Southside *study region* runs from approximately July to October every year. The actual marketing of the tobacco takes place at a *tobacco warehouse*. A warehouse is just that, a large covered floor, but normally tobacco is not stored there for any great length of time. Each tobacco producer must designate before the start of the marketing season their warehouse choice. Producers are required to market their tobacco at the designated warehouse for the entire marketing season. This requirement is necessary in order to impose the quota controls. Although the basic marketing process is the same at every warehouse, the owners of warehouses can take steps to differentiate his or her establishment, including the commission charged.

IV.5.3.1 Marketing Process

A brief description of the warehouse marketing process follows, with a focus on inputs in this process. The marketing of tobacco, or the auction system, has changed little in the past few decades. Producers are responsible for a preliminary sorting of their tobacco by grade prior to bringing the tobacco to the warehouse. Each pile of tobacco is placed on a sheet. Producers are responsible for transporting the tobacco to the warehouse, although larger producers may hire outside services. At the warehouse the tobacco is unloaded, weighed, registered, ticketed, and then laid out on the warehouse floor in piles arranged in long rows[40]. Warehousemen often provide laborers to assist in moving the tobacco, and provide the clerical and sales personnel for the registration. Before the auction commences, the tobacco is graded by USDA personnel, and the ticket for each pile is so marked. The warehouse operator or manager, and sometimes additional warehouse sales staff, usually participate in the auction that follows.

The actual auction is run by an outside auctioneer and ticket marker that earn a separate commission. The tobacco is auctioned by pile as the auctioneer and buyers quickly proceed down the rows of tobacco. The traditional heaviest buyer gets the best position in the line of buyers. The ticket marker follows everyone and marks the ticket with a price and the buyer. The buyer will often have his or her own person following as well to add a marking indicating for whom they purchased the tobacco. The producer is paid the same day of the sale by the warehouse operator, who is then responsible for collecting from the buyer.

Finally, almost immediately after the sale, the tobacco is usually sorted by buyer, bulked, and then loaded onto trucks by a service that is hired by the buyer. There are companies

[40]Registration includes entering the weight on the producer's marketing card as part of the quota control procedures. A marketing card is kept on file at the warehouse for each farm that is registered to sell there. This may include quota from another farm that the producer is renting. Alternatively, the marketing card is kept by the producer and is presented at each sale. The rental arrangement, or proceeds designation, is made in advance of the sale so checks can be cut quickly after the auction.

that specialize in this service. During one warehouse visit, an employee of the warehouse said the buyer pays from $3 to $3.50 per 100 pounds of tobacco for this service. At this rate, this specialty service generates revenues of approximately three million dollars in the Southside *study region*. Trucking companies are hired by the buyer to haul the tobacco to its next destination.

IV.5.3.2 Southside Virginia Tobacco Warehouse Survey

Table 3.7 indicates that there are 26 flue-cured tobacco warehouses in Virginia, all of which are located within the Southside *study region*. These warehouses are grouped into seven *markets* for statistical purposes. Figure 3.5 provides a map that shows the location for these Virginia tobacco markets, as well as for potentially competitive North Carolina flue-cured Type 11 markets. All 26 Virginia warehouses are surveyed for this study. Appendix 2 provides a copy of the survey form. Thirteen, or half of the warehouses, responded to the survey. Of these responses nine are completed by the owner and four are completed by the warehouse bookkeeper. While a higher response is desirable, this is actually a positive result given the general closure of the industry toward outside queries, perhaps encouraged by the current hostility by many toward the industry.

Survey respondents were guaranteed that individual results will remain confidential. The results presented here will be aggregated in order to maximize this confidentiality. One warehouse owner stressed the need for confidentiality, noting that buyers are very protective of their purchase figures. Questions 4 and 5 of the survey pertain to the purchases of the tobacco by buyer[41]. Table 4.19 provides aggregate results of the distribution of purchases by buyer at Southside warehouses. Disclosure of aggregate results does not reduce the findings. This contention is supported by totals and percentages that are compiled by warehouse and by market, but that are not fully

[41] Warehouses maintain these purchase figures because they are required to report them to the federal government. The government will not release these figures.

disclosed. Six of the seven markets have one or more warehouses responding. Table 4.20 indicates the rate of response by market. The rate of response is based on actual reported gross sales by market, provided by the Virginia Agricultural Statistics Service. Fairly comprehensive coverage by market is obtained by the survey: of total sales of 97,804,368 pounds in Southside Virginia, 46.68 percent is covered by responses to the survey.

Buyer percentages remain fairly constant over warehouses and markets. These results give some confidence in extrapolating the results to the entire population. Question 5 asked whether these proportions are consistent with the previous three years except for Cooperative purchases[42]. Eleven of the operators indicated it is consistent, while the remaining two did not respond.

Table 4.19 Southside Virginia Tobacco Buyer Distribution - 1995 Survey Results

Purchaser	Pounds	Percentage of Total Pounds (%)	Dollar Sales ($)	Percentage of Dollar Sales (%)
Buyer 1	676,654	1.48	1,205,344	1.45
Buyer 2	10,661,812	23.36	19,365,085	23.37
Buyer 3	2,019,003	4.42	3,722,368	4.49
Buyer 4	8,975,697	19.66	16,310,527	19.68
Buyer 5	1,132,633	2.48	1,973,713	2.38
Buyer 6	16,607,409	36.38	30,210,624	36.46
Buyer 7	5,577,429	12.22	10,076,342	12.16
Total	45,650,637	100.00	82,864,004	100.00

[42]Cooperative refers to the Flue-cured Tobacco Cooperative Stabilization Corporation.

Table 4.20 Warehouse Survey Response Compared to Sales by Market

Market[1]	Percentage of Sales Pounds (%)
Market 1	0.00
Market 2	18.20
Market 3	42.65
Market 4	43.47
Market 5	59.52
Market 6	78.82
Market 7	99.34
Total	46.68

[1] Market numbers do not pertain to any existing market numbering scheme. Markets are sorted in a different order in the left-hand side table from the right-hand side table in order to preserve the confidentiality of responding warehouses.

Market	1995 Sales Gross Pounds
Chase City	3,575,858
Clarksville	9,028,925
Danville	50,705,659
Kenbridge	1,343,490
Lawrenceville	7,680,271
South Boston	15,268,735
South Hill	10,201,430
Total	97,804,368

Source: Virginia Agricultural Statistics Service

As already noted, there is little variability in each buyer's proportion of total purchases, leading to confidence in extrapolating the results of the survey to the entire warehouse population. Information gathered during a visit to a warehouse auction gives further support to this contention. During the auction it was noted that buyers almost seemed to take turns in purchasing piles of tobacco. A warehouse employee said there is a 'ration' made by the auctioneer using previous buying history. This observer estimated the ration for buyers at this warehouse (Table 4.21). His ration estimate is compared with the actual results from the warehouse survey:

Table 4.21 Tobacco Buyer Distribution - Comparison of Estimate with Survey Results

Buyer	Estimate (%)	Survey (%)
Buyer 2	30.00	28.14
Buyer 4	20.00	19.30
Buyer 6	35.00	39.43
Buyer 7	10.00	11.59
Other	5.00	1.54

As can be seen, this warehouse employee's estimates are close to the actual survey results. There is some variation for the Southside *study region* as a whole, with the introduction of another buyer in some markets, but the general proportions hold true. Some of these buyers are also stemming and redrying operators. Section IV.5.4.4 will discuss relationships between the buyers and the stemming and redrying operators, as well as with cigarette manufacturers.

There are other matters surveyed besides the purchaser distribution. Question 1 has the same response for every warehouse: only flue-cured tobacco is sold. Question 2 asks how much of the tobacco sold at the warehouse is grown in the Southside *study region.* The responses ranged from a low of 33 percent to a high of 100 percent. The weighted average based upon sales is 69 percent. Another part of question 2 asks how much of sales is attributed to tobacco grown out-of-state (making possible the computation of the in-state, but out-of-region total). The survey weighted average of sales from tobacco grown out-of-state is 30 percent. Cross-border sales totals provided by the CFSA (see Table 3.9) indicate that 21.2 percent is the actual proportion. The survey response for in-state, but out-of-region sales is approximately one percent. Given flue-cured production statistics for Virginia (Table 3.1 indicates the Southside *study region* has 77 percent of Virginia's production), and the fact there are no other flue-cured markets in the Commonwealth, this one percent balance appears low, perhaps distorted by the high out-

of-state response. The survey responses did tend to fit the expected pattern of higher percentages of out-of-state production sold in markets closer to the border with North Carolina. Responses to question 3 indicate that these sales percentages are consistent with the previous three years.

Questions 6 and 7 have the widest range of responses, as expected. One question asks what percentage of the tobacco sold in 1995 at each warehouse is stemmed and redried by Southside operators. This question expected an estimate, because the warehouse owners have no way of knowing the tobacco's destination once it is loaded onto a truck at their loading dock. An informed estimate requires knowledge of the industry and an appreciation of the presence of the stemming and redrying operators in the Southside *study region*. Two owners opted not to respond, one noting that it would only be pure speculation, and the other noting that a lot of stemming and redrying is done in Danville and the rest in North Carolina. Others offered estimates ranging from 0 to 100 percent. The average response is 31 percent, and this drops to 24 percent if the 2 highest and 2 lowest replies are dropped. The same observer who provided the earlier ration estimates provided an estimate that 65 to 70 percent of Southside tobacco is processed in Virginia. This person also noted that Philip Morris may have all of their tobacco purchases stemmed and redried in Virginia. A later section will discuss this same question of Southside tobacco stemmed and redried in the Southside, as posed to the Southside processors in a processor survey.

The last question, question 8, surveys the number of employees, the nature of their work, and the period and intensity of their employment at each warehouse. Table 4.22 provides aggregated survey results. From the half of the warehouses responding, there are 159 employees that work on average 39 hours a week for 16 weeks. This response reflects the marketing season of flue-cured tobacco, as most of the jobs are seasonal. Not reported in the table is the total number of hours of employment calculated from the survey

responses. Total hours is 100,152. If this is extrapolated over the non-responding warehouses based upon sales, then approximately 214,550 hours of employment is generated by the flue-cured tobacco warehouses in the Southside study area. Assuming a wage rate of $5.00 per hour for all of these jobs, the payroll generated is $1,072,750[43].

Table 4.22 Survey Results on 1995 Southside Warehouse Employment

Job Category	Number	Average Hours per Week	Average Number of Weeks
Management	25	42.12	20.28
Office Workers	39	26.08	14.97
Laborers	84	43.21	15.20
Other	11	50.00	22.00
Total	159	39.31	16.42

Note: It appears that a few owner/operators did not include themselves in the employee roster, so the management numbers may be low in this regard.

IV.5.3.3 Conclusion

The warehouse commission at one warehouse is 2.5 percent of gross sales. When this commission rate is applied against estimated 1995 producer gross sales for the Southside region, the warehouses earned commissions of over four million dollars[44]. Clearly warehouses are an important part of the tobacco trade flow cycle. Survey responses provide a further indication of this importance and also help to explain the nature of these flows.

The tobacco loaded onto trucks following auction can have a number of different destinations, depending on who the buyer is. Some of the tobacco will be transported to a

[43]The wage rate of five dollars per hour may be conservative. One warehouse owner stated his annual payroll in dollars, and when compared to the survey results he provided, the average wage is close to six dollars per hour.

[44]1995 gross sales are 176,735,035 dollars. After netting this figure for resales, producer sales are 165,994,806 dollars. Commissions may be earned on some of the resales, but the more conservative figure is used. Note that comparable producers sales are 147,015,348 dollars and 154,406,764 dollars for 1994 and 1993, respectively.

storage center to await further processing. Other tobacco may be exported immediately with no further processing. However, it is likely that the majority of the tobacco is transported directly to a stemming and redrying facility for further processing.

IV.5.4 Tobacco Stemming and Redrying Operators

Previous sections demonstrated the importance of stemming and redrying operations to Southside Virginia. This section will add more detail in regard to both the nature of the industry and regional specific information. These support the understanding of an examination of the inputs to the production process and the contribution to the Southside economy performed in a later section. Another section looks at interindustry relations maintained by stemming and redrying operators with cigarette manufacturers and others.

IV.5.4.1 Stemming and Redrying Process

The purpose of the stemming and redrying industry is to remove the tobacco leaf from the stem, sort the leaf by size, bring it to a uniform moisture content and store it under pressure. The process begins with forklift loads of tobacco being fed into the production line. At the start of the line, machinery breaks up the load of tobacco and places it on a conveyor belt that begins the travels of the leaf. The first stop is usually a huge conditioning drum that is similar to the drum on a cement truck. The purpose of the conditioning drum is to wet the tobacco and remove sand and dirt. After the conditioning drum the tobacco continues forward on a conveyor belt. At this stage there may be some production line laborers who view the tobacco going by and pick out foreign matter. This 'pick' procedure occurs at various stages in the production process. Various attempts have been made to automate this procedure, but human intervention is still more efficient.

The next stage is the threshing process. The leaf goes through a number of threshers that remove the leaf from the stems. The objective is to maximize the leaf, or *lamina*, and minimize waste. The lamina and stems are fed by conveyor to various air separation

chambers. These chambers will blow the lighter-weight leaf out to other conveyors and feed the stems to their own conveyor[45]. The leaf will then pass over shaker tables with different sizes of screens to remove undersize pieces[46].

After all of the sorting processes, the leaf finally passes by conveyor through the redrying ovens. It is at this stage that the tobacco is adjusted to the desired moisture content according to customer specifications. The processing of the tobacco ends at this stage. All that remains is the packaging of the tobacco, under pressure, in containers specified by the customer. These containers may be the traditional wooden hogshead, cardboard boxes or shrink wrap. Samples are also taken prior to packaging in order to conduct various quality control tests in the factory laboratory. The boxed tobacco is usually shipped off the plant floor fairly quickly after production. However, the tobacco is not yet ready to be used in the production of cigarettes. Normally the tobacco must be aged from 12 to 15 months before it is used. Large warehouse complexes exist for this purpose. The stemming and redrying operator may provide this service, or the tobacco may be aged at buyer facilities.

IV.5.4.2 Southside Stemming and Redrying Operators

As indicated earlier, two stemming and redrying operations are located in the Southside region: DIMON, Inc. and Southern Processors, Inc. The DIMON factory, formerly Dibrell Brothers prior to the merger with Monk Austin, is located in Pittsylvania County just outside of the Danville city limits. The Southern Processors factory is across the street and is located inside the city limits. DIMON also has another presence in the region with its corporate headquarters located in downtown Danville in the old warehouse district. Although the DIMON headquarters are in Danville, part of the merger agreement

[45]Stems are processed further and boxed separately for use by other processors. These processors may 'explode' and process these stems so that they may be used just like leaf.
[46]These undersize pieces will also be processed separately and packaged for use by other processors. Some of this fine grain tobacco is used in making reconstituted leaf tobacco.

results in the tobacco leaf operations management being located in the old Monk Austin headquarters in Farmville, North Carolina.

In order to gain additional information for this study, the DIMON headquarters and both the DIMON and Southern Processors factories were visited. The DIMON factory has three different production lines that can process over one million pounds in a day. At peak production 1.3 million pounds of tobacco may be unloaded from trucks in a day, each truck holding approximately 50,000 pounds of tobacco. The immediate factory grounds can hold eight million pounds of tobacco. At the time of the visit in December, 1995, two of the lines are producing tobacco for Philip Morris and the other line is producing for Lorillard[47]. According to one employee, no R.J. Reynolds tobacco is being processed by the Pittsylvania plant; all R.J. Reynolds tobacco that is processed by DIMON that year is being processed at plants in North Carolina. An approximate production schedule for the Pittsylvania DIMON plant is as follows: production opens approximately four days after the flue-cured season begins in Georgia, sometime in mid-July. The flue-cured season is in peak production from the first of August until Thanksgiving. Production changes to burley around December first (including Kentucky Burley) and continues to approximately February tenth. From approximately February tenth until some time in March, Maryland type tobacco is processed. In prior years, production from March until July is sustained with tobacco brought in by rail from Mexico. Not all of the lines are operated for the entire year so that annual maintenance can be performed. DIMON's workforce is approximately 70 percent women and 90 percent African-American. At both factories, many of the seasonal employees return year after year.

The Southern Processors plant has only one production line, but apparently it produces

[47]Recall Chapter III discusses the closing of the Lorillard Danville stemming and redrying factory. DIMON won the contract to process the tobacco previously processed by this Lorillard facility.

more than any of the individual DIMON lines. The Southern Processors line can process up to 800,000 pounds in a day. Their production season also starts in July, but will end sometime in March or April. Production is halted for three months, and maintenance is conducted on the line. For this production season the plant is only processing flue-cured and burley tobacco. The parent company annual report indicates the Southern Processors plant has an annual capacity of over 100 million pounds (Universal Corporation). Discussion during the factory visit did not disclose Southern Processor's customer base. However, Philip Morris probably accounts for much of the volume.

Because the production process is similar, both plants consume the same inputs. Besides labor and tobacco, energy is one of the most significant inputs. The DIMON factory purchases approximately $750,000 in electricity from American Electric Power Company in a year. Southern Processors claims to be the largest customer of Danville City electric. Alternative fuels are also used to a lesser extent. Packaging of the tobacco is another large input. The packaging used depends on the customer. Most favor cardboard boxes, although some still use the old wooden hogshead, while yet others are trying newer shrink wrap. DIMON reported that perhaps over one million dollars is spent on these packaging materials. Transportation is also a large expense to move the tobacco to and from the plant. However, even costs associated with transportation within the plant can be substantial. DIMON owns over 60 forklifts and rents more during the peak season. Propane alone to operate the forklifts costs over $90,000 per year. Finally, the depreciation on the machinery in the plant and the maintenance associated with it are obviously additional large recurring expenditures.

IV.5.4.3 Stemming and Redrying Inputs and Linkages

The factory tour illustrates some of the significant inputs to the stemming and redrying production process. However, rather than requesting detailed corporate budgets to obtain

better detail on all expenditures, a budget from the IMPLAN model is used[48]. Table 4.23 makes use of an IMPLAN report to list the top 15 budget items for the stemming and redrying industry[49]. This budget is reflected in proportions of the total output, or *absorption coefficients*. Table 4.23 also provides gross inputs, regional share and outside share based on total output for the stemming and redrying industry in the Southside *study region* for 1992. Regional share reflects the portion of the inputs purchased from Southside suppliers, while the outside share is the remaining balance. More explanation of the absorption coefficient and how IMPLAN calculates these shares is found in Chapter V.

Total output for the stemming and redrying sector is over $725 million. Note that many of the budget line items correspond to what is seen during the plant tours. Tobacco is by far the most significant input to the production process. Combining tobacco, reintroduced stemming and redrying output, and employee compensation, 74 percent of the budget is accounted for by these 3 inputs alone. Three income categories account for 19 percent more of the budget, leaving only 7 percent of the budget for other input items.

Examination of the 1992 Census of Manufactures, Industry Series for Tobacco Products, is helpful in analyzing the accuracy of the budget. However, the Census is hampered by both disclosure restrictions and the relatively few categories of budget lines that it carries. Table 6a of the Census indicates that $3,067.9 million of stemmed and redried tobacco is produced (U.S. Bureau of the Census, 1992 Census of Manufactures, p. 21A-14). Table 7 of the Census, materials consumed by kind, has $1,623.6 million of unprocessed tobacco input and $554.0 million of stemmed and redried tobacco input. Using the stemmed and

[48]Corporate budgets are usually kept confidential. To avoid ending existing goodwill, no request is made for the budgets or similar detail.
[49]These fifteen budget lines are out of 526 input sectors and four value added sectors present in the IMPLAN model for the Southside study region.

Table 4.23 Tobacco Stemming and Redrying Operations Budget and Share of Output

Sector	Total Absorption Coefficient	Gross Inputs [and Income] ($ Millions)	Regional Share ($ Millions)	Outside Share ($ Millions)
Tobacco	.567	411.334	47.433	363.901
Other Income	.186	135.062		*135.062
Tobacco Stemming and Redrying	.111	80.195	80.195	.001
Employee Comp.	.062	45.031	*45.031	
Motor Freight Transport and Warehousing	.019	13.970	11.598	2.372
Noncomparable Imports	.013	9.726		9.726
Wholesale Trade	.013	9.100	2.594	6.505
Electric Services	.007	5.253	2.277	2.976
Proprietary Income	.003	2.222		*2.222
Maintenance and Repairs - Other Facilities	.002	1.737	1.737	
Indirect Business Taxes	.002	1.423	*1.423	
Real Estate	.002	1.317	.456	.861
Advertising	.001	.949	.707	.242
Paperboard Containers and Boxes	.001	.752	.212	.540
Banking	.001	.639	.386	.253
Subtotal	.991	718.712	194.050	524.662
All Other	.009	6.410	2.322	4.088
Total	1.000	725.122	196.372	528.750

Source: IMPLAN 114B Report for the Southside *study region.*

* Allocation of the four components of value added between regional inputs and domestic imports is made by the author. The IMPLAN report did not provide such an allocation. The author assumes this is a conservative calculation; the regional share will actually be higher due to some corporate owners residing within the region. However, an offsetting factor is employee compensation lost from the Southside region due to employees that reside outside the region. The author places all employee compensation in the regional column.

redried production figure, these tobacco inputs are 53 percent and 18 percent of the total. This compares relatively favorably with the IMPLAN figures of 57 percent and 11 percent, respectively, provided in Table 4.23. Given the lack of any further information to substantiate any change to the IMPLAN absorption coefficients in Table 4.23, they will be accepted 'as is' for the remainder of the study.

Table 4.23 provides more than just an indication of inputs used in the stemming and redrying production process. The fourth column, regional shares, provides IMPLAN's estimate of the share of inputs that are purchased in the Southside *study region.* For example, only $47 million of $411 million in tobacco inputs are purchased from the Southside region. IMPLAN uses various techniques for estimating the regional share: this will be discussed in more detail in Chapter V. However, it is readily apparent that the estimation of this factor for the tobacco input is important to consideration of the economic contribution of the stemming and redrying industry to the Southside study area; one unit of increased production does not mean the equivalent unit increase in tobacco input all comes from the Southside region. Chapter VI looks at this economic impact in more detail, with special consideration of the impact of supply control on this scenario.

The previous paragraph indicates the importance of knowing the correct regional share of tobacco inputs used by Southside stemming and redrying operators. While tobacco warehouse owners were questioned about this share, responses varied widely. More directly to the question, the Southside stemming and redrying operators were also asked what their Southside-produced tobacco consumption is in proportion to their total consumption. Appendix 3 contains the survey form used to ask this and other questions. Question 1 asks for 1995 production in pounds for both flue-cured and all other types of tobacco. Table 4.24 provides the survey response.

Table 4.24 1995 Southside Stemming and Redrying Survey - 1995 Processing of Tobacco Inputs (Thousands of Pounds)

Type of Tobacco	Processor 1 (Pounds)	Processor 2 (Pounds)	Total (Pounds)	Processor 1 (%)	Processor 2 (%)	Total (%)
Flue-cured	47,000	67,584	114,584	55.3	59.2	57.6
All Other	38,000	46,515	84,515	44.7	40.8	42.4
Total	85,000	114,099	199,099	100.00	100.00	100.00

Note: The names of the stemming and redrying processors are not disclosed in order to preserve confidentiality.

Question 2 asked if the processing proportions of flue-cured and other types of tobacco provided in Question 1 are consistent with the previous three years. Processor 1 replied that the typical processing percentage for flue-cured and all other types of tobacco is normally 60 percent and 40 percent, respectively. This is consistent with Processor 2's response. These proportions most likely coincide with the production seasons and volumes for flue-cured tobacco, and burley and other types of tobacco.

Question 3 asks the important question of how much of the flue-cured tobacco processed in the operator's plant was purchased at Southside markets. Table 4.25 provides the survey response. Only one of the two operators elected to reply to this question. The response for the other operator is used to estimate the incomplete information. The accuracy of this estimate is indeterminate, but given the volume of North Carolina flue-cured tobacco production bordering the Southside *study region* and other industry relationships, it is feasible that the same relationship holds for both processors. According to the response provided, less than 40 percent of the flue-cured tobacco processed is purchased in Southside markets. The operator that responded to Question 3 indicated that these proportions are consistent with the previous three years in their reply to Question 4.

Table 4.25 Southside Stemming and Redrying Survey - 1995 Processor Purchases of Flue-cured Tobacco (Thousands of Pounds)

Area	Processor 1 (Pounds)	Processor 2 (Pounds)	Total (Pounds)	Processor 1 (%)	Processor 2 (%)
Southside	* 18,095	26,000	44,095	N.R.	38.5
Other Markets	* 28,905	41,584	70,489	N.R.	61.5
Total	47,000	67,584	114,584	100.00	100.00

* Estimated using Processor 2's percentage.
N.R. - no response.

The survey also attempts to formalize the employment figures that are noted in the earlier description of the plant tours. Table 4.26 provides the response to Question 5 on this matter.

Table 4.26 1995 Southside Stemming and Redrying Survey - Combined Response for 1995 Employment

Job Category	Number Employed	Average Hours per Week	Number of Weeks
Year-round Salaried	142	45	52
Year-round Hourly	90	42	52
Seasonal Hourly	920	44	35
Total	1,152	44	39

IV.5.4.4 Industry Interrelations

An understanding of the stemming and redrying industry is not complete without an understanding of the business relationships present in the industry. A better understanding of these relationships can also help to partly explain some of the trade flows that exist in the industry. There are 12 flue-cured stemming and redrying plants, but only 5 parent companies. Universal Corporation, the industry leader, owns five plants including the Southern Processors plant. DIMON, Inc. follows in market share

and has three plants, including the plant located in Pittsylvania County. DIMON also owns half of another plant, which operates under the name Eastern Carolina Leaf Processing Company. One of the five parent companies counted above, Intabex-Hail & Cotton International Company, owns the other half of Eastern Carolina Leaf. The parent company that has the third largest market share is Standard Commercial Corporation. There are two flue-cured plants in North Carolina owned by Standard Commercial. Finally, RJR Nabisco, Inc., or its subsidiary R.J. Reynolds Tobacco Company, has a plant in North Carolina that processes for its own use. Figure 3.3 maps the location of all of these plants.

Some of the operating names of stemming and redrying plants listed in Table 3.5 can be associated with tobacco buyers. Four larger buyers can be associated in this way. DIMON, Standard Commercial and Eastern Carolina Leaf are all both buyers and redriers. J.P. Taylor is the name of one of Universal Corporation's redrying operations and is also the purchasing arm of the company. Export Leaf Tobacco, another large buyer, is not accounted for by this association of redriers and buyers. Export Leaf is owned by the Brown and Williamson Tobacco Corporation, a cigarette manufacturer. An earlier section previously noted that Brown and Williamson is owned by B.A.T. Industries PLC[50]. Export Leaf does not redry tobacco: any redrying of flue-cured purchases performed in the United States is done by one of the other companies.

Most stemming and redrying business is conducted for cigarette manufacturers. In fact, the majority of the purchases are made 'on account', based on orders or standing contracts with cigarette manufacturers, reducing the risk of the buyers and processors. The first place to begin analyzing customer relationships is with the industry leader in tobacco processing, the Universal Corporation.

[50]B.A.T. Industries also owns American Tobacco.

A 1995 book about the Universal Corporation notes the close relationship between Universal and Philip Morris, the largest U.S. cigarette manufacturer. The book states that Universal has traditionally bought "virtually all of [Philip Morris] U.S. grown tobacco" and "the lion's share" of their foreign purchases as well. This relationship has further developed to where Universal also stems and redries the "major part" of Philip Morris' tobacco (Duke and Jordan, pp. 152-153). Universal's annual report confirms this relationship is significant, noting that Philip Morris is the only customer accounting for over 10 percent of sales, while 5 others only account for 14 percent (Universal Corporation, June 30, 1995, Form 10K). It is likely these five customers at the time of the 10K report are R.J. Reynolds, American Tobacco, Lorillard, Brown and Williamson, and Liggett and Myers (given major customers listed in the book). Most of these customer's business is probably processed by two subsidiary operations: Thorpe and Ricks and K.R. Edwards Company (Duke and Jordan, p. 153).

An industry observer confirmed that Universal has the largest part of Philip Morris' redrying business, but where the tobacco is ultimately redried depends on industry capacity at the time it is needed. This observation conforms with the observed processing of Philip Morris tobacco by DIMON in Pittsylvania County. It is likely that much of Southern Processors' (a Universal subsidiary) capacity is also used to meet Philip Morris' needs. As noted earlier, another industry observer suggested that all of Philip Morris' tobacco is redried in Virginia. Locational theory that emphasizes transportation costs would suggest that the Virginia redrying factories may be more advantageous to Philip Morris due to their location more enroute to the cigarette factory's location in Richmond than are the North Carolina stemming and redrying factories[51]. However, industry capacity, contractual relationships and other factors also enter the picture. It is likely

[51]Examination of the map of redrying plants in Figure 3.3 and use of a highway may indicate that the advantage to the Virginia redriers may be slight. Another important consideration is the markets where the tobacco is purchased. A complete traffic and transportation optimization model is needed to determine the actual advantage.

though, especially with recent industry consolidation, that locational factors will become more important.

Some of DIMON's customer relationships likely develop from pre-merger Monk-Austin and Dibrell Brothers. Monk-Austin had five large customers in 1994: American Tobacco, Brown and Williamson, Japan Tobacco, Philip Morris and Rothmans International (Monk-Austin, June 30, 1994, Form 10-K/A). Dibrell had three customers that each accounted for more than ten percent of sales in 1994: Philip Morris, Japan Tobacco and R.J. Reynolds (Dibrell Brothers, June 30, 1994, Form 10-K). Chapter III explained one of the relationships the merged entity has established, taking over the purchasing and processing of Lorillard's domestic requirements. Another agreement reached during the time of the merger establishing DIMON is with R.J. Reynolds. This 1994 agreement is a purchasing agreement where DIMON buys all of R.J. Reynolds domestic needs[52]. Redrying is another matter, as R.J. Reynolds does some of their own and also uses Universal, DIMON and perhaps others. R.J. Reynolds tobacco redried by DIMON for the 1995 season is probably all done in DIMON's North Carolina plants, as the DIMON plant in Virginia is processing for Lorillard and Philip Morris during the flue-cured season.

Standard Commercial has two customers that each account for more than ten percent of sales: Philip Morris and Japan Tobacco. Their five largest customers account for 56 percent of sales. In the prior year Standard Commercial maintained the same relationships, but in fiscal 1993 Brown and Williamson was the largest customer (Standard Commercial, March 31, 1995, Form 10-K).

As can be seen, the industry relationships do under-go change, and each cigarette

[52]R.J. Reynolds International is reported to have several buyers purchase for their requirements on the U.S. auction market.

manufacturer tends to spread its business around. All three of the largest stemming and redrying operators have significant business with Philip Morris, but this holds true for Universal in particular. R.J. Reynolds also appears to move its business around, but DIMON appears to get the largest share of the business that R.J. Reynolds does not process themselves. Japan Tobacco is important to DIMON and Standard Commercial. It is difficult to tell who gets the largest share of Brown and Williamson's and American Tobacco's business, particularly now that both are owned by B.A.T. Industries. DIMON processes all of Lorillard's tobacco.

From these relationships, it is difficult to accurately estimate the flows of tobacco from the Southside tobacco markets to the Southside stemming and redrying operators. Chapter VI will discuss this implication further, but it is clear in any event that the Southside stemming and redrying operations are important to the region.

IV.5.5 Tobacco End Products and Consumption

The section on interindustry relations for the stemming and redrying industry already introduces a number of the significant producers of tobacco end products, larger cigarette manufacturers. Although dwarfed by cigarette manufacturers, there are other producers of tobacco end products. Table 3.6 indicates the relative significance of makers of cigars and chewing and smoking tobacco. These two industries employ fewer individuals than the stemming and redrying industry, and although significant to some regions, they will not be discussed any further in this study.

Table 4.27 provides recent figures on the market share for U.S. cigarette manufacturers. The table confirms the previously noted fact that Philip Morris is a strong market leader. Not shown in the table is market share prior to American Tobacco's 1994 merger into Brown and Williamson. Pre-merger, they had respective shares of approximately 7.4 percent and 11.4 percent (John, p. 30).

Table 4.27 Market Share for U.S. Cigarette Manufacturers

Company	1994 Percentage (%)	1995 Percentage (%)
Philip Morris	44.8	46.1
R.J. Reynolds	26.7	25.7
Brown and Williamson	18.7	18.0
Lorillard	7.5	8.0
Liggett	2.3	2.2

Source: http://www.tobacco.org/Resources/mktshr.html. This credits John Maxwell, "Premiums Up", *Tobacco Reporter*, March 1996, p. 16.

Some of the principal production locations of cigarettes are as follows: Philip Morris in Richmond, Virginia, R.J. Reynolds and Lorillard in North Carolina, and Brown and Williamson in Kentucky. Cigarette manufacturers rely heavily on export sales. Domestic sales involve heavy advertising and promotion. Cigarettes are retailed widely, primarily at convenience stores and supermarkets. In a forecast of United States core sector employment related to the tobacco industry, the wholesale and retail trade contributed almost 53 percent of total employment[53] (Price Waterhouse, p. 3). This wholesale and retail employment is spread throughout the country and is less significant to these regions than the sectors discussed in detail in previous sections.

IV.6 Conclusion

This chapter provides a regional descriptive analysis of the Southside *study region*. Selected demographic and economic measures presented in this chapter indicate a larger segment of the regional population fairs worse than the average for the Commonwealth. Coupled with other economic statistics, the regional economy can be seen as less robust than the Virginia economy. The Southside economy is also less diverse than the United

[53]This 1990 study forecast 1986 core employment from the tobacco industry as 422,462 jobs. Of this total, 35,190 pertained to the wholesale trade and 187,737 to the retail trade. Other categories and totals are: tobacco growing, 130,073, auction warehousing, 7,771, and tobacco manufacturing, 61,691. Gale

States economy, having a larger proportion of total industry output from manufacturing. This manufacturing base is significantly dependent on exports from the region. Additionally, a number of industries make up a disproportionate share of the Southside economy. The tobacco and tobacco stemming and redrying sectors together make the tobacco industry one of the most important sectors in this region, one that the region is economically dependent on both directly and indirectly through linkages to other sectors.

Accordingly, this chapter has looked at the tobacco industry in more depth, also recognizing the role of other tobacco-dependent businesses. A prime example is tobacco warehouses, but other agribusinesses derive a significant share of their volume from the tobacco trade. Findings in this area set up further work in Chapter VI that will examine the regional economic impact of negative changes on the tobacco industry.

---

forecasts much lower employment related to the core sector at 160,000 for 1990 (Gale, p. 4). He only forecasts approximately 5,500 retail jobs and 43,000 wholesale jobs (p. 5).

Chapter V

Input-Output Analysis Theory and IMPLAN Techniques: A Review of the Literature

V.1 Introduction

Input-output (I/O) models use data expressing the relationship that a particular industry has with all other industries in an economy. ... The impact of a change in one or more industries on all other industries and on the entire regional economy can be examined using this method.

-- Broomhall and Johnson, p. 79.

Studies that conduct impact analysis invariably include the ubiquitous description of input-output theory. This study will be no different: Chapter V presents this standard description or *basic accounting framework*. However, all too many studies leave the theory after a rather simple presentation of this framework, even if it does not adequately illustrate the complexity of the model being used. Such an inadequate description and potential lack of understanding of the model being used is not a surprising development given the relative ease of acquiring and using existing input-output packages. The danger in proceeding with any analysis without understanding the complexity and intricacies of

the package is obvious. IMPLAN, the model selected for this study, is a complex package that is not immune to misuse. Therefore, an explanation of the basics of the IMPLAN model will be incorporated into this chapter. An additional focus will be made on those parts of the model that are of particular applicability to this study.

There are legions of presentations of the basic input-output accounting framework and at least several that explain IMPLAN's. It is difficult to derive a unique presentation of accounting identities, so the following presentation will call on two standard references, Miller and Blair (1985) and Richardson (1972). More problematic is the fact that there is not any standard notation or terminology used in input-output analysis. One set of notation will be presented, while in some cases a number of common names for the same term will be provided. Note that the common names provided are not meant to be fully comprehensive.

V.2 History of Input-Output

Present day input-output applications and practice can attribute their grounding to the work of one man this century: Wassily Leontief. While some of the underpinnings and theory came from predecessors, Leontief established the use of this tool today. There is no controversy about this fact, as Leontief was awarded the 1973 Nobel Prize in Economics for his work in this area. Leontief is honored for his efforts by the application of his name to a central component of input-output, the inverse matrix of multipliers, often referred to as the Leontief inverse.

V.3 Basic Input-Output Accounting Framework

Leontief did build on earlier efforts of others. One commonly cited example is work in the 1700s by the Frenchman Francois Quesnay on his Tableau Economique. The idea that parts of an economy can be related to each other through their expenditures, and that

these relationships or flows can be laid out in a table format, originates with Quesnay. Leontief developed the idea further into what is today called the *transactions table*.

V.3.1 Social Accounting Matrices

A *Social Accounting Matrix (SAM)* typically shows the current account flows for a period of time in a region[54]. Thus, they are seen as a 'snapshot' of the regional economy. The flows are captured in the form of a table. This table shows the flows between different sectors at a sectoral level, limited only by the amount of disaggregation that can be performed with the data collected[55]. Typically, rows indicate 'incomings' or receipts, while columns indicate 'outgoings' or expenditures. SAMs are often favored when compiling the current account information for a region, because of the double-entry accounting rigor they enforce (the sum of incoming and outgoing accounts must balance in a SAM) and the fact that they display the information in a more easily interpreted single entry table format.

V.3.2 Input-Output Transactions Table

Input-output normally uses only a subset of SAMs in generating a transaction table. While SAMs usually capture demand for product by consumer consumption, government, investment and exports as separate endogenous sectors, these are usually exogenous in an input-output transactions table. Furthermore, while SAMs have different disaggregation schemes depending on their proposed use, an input-output transactions table usually disaggregates its sectors by industry. Thus, input-output transactions tables look at inter-industry flows. The bulk of the detail captured in these tables is the sale of *intermediate inputs* from one sector or industry to another.

---

[54]A current account measures income and expenditures for goods consumed immediately. Because only current account information is captured in SAMs, capital flows and levels are not detailed. However, SAMs usually capture savings and investment flows.

[55]Recall that the term, sectors, was defined in section I.1 as an economic classification of similar industries and institutions.

Intermediate inputs are goods used in the production of other goods. For example, iron ore is an intermediate input for steel. An ***nxn*** matrix by sector of intermediate demand and intermediate inputs is a common construction. A frequent notation used to indicate placement and flows in this table is Z_{ij}, where i is the row and j is the column and $i,j = 1,n$ for n sectors. Thus, if tobacco is one of the sectors, the row would give all of the sales by tobacco producers to other sectors, while the column would provide all the purchases of inputs by the tobacco sector from all other sectors[56]. If the tobacco sector is the second row (and column) and the stemming and redrying sector is the fifth column (and row), then Z_{25} would reflect tobacco production sold to the stemming and redrying industry. The notation exhibits a 'from-to' relationship.

Intermediate inputs are not the only factors of production. If all of the intermediate inputs in a sector column are summed, the sum will not equal the output for the sector. In notation terms, *output* for a sector column is X_j. W_j is the sector payment made for inputs other than intermediate inputs, usually made up of imported inputs and value added factors. Thus, $X_j = Z_j + W_j$, where Z_j is the sum of the column's Z_{ij}'s.

Value added can be equated with the terms *Gross Regional Product* or *Gross Community Product*, which is a measure of the total output of the region after subtracting intermediate inputs and imports. What remains in the value added measure is inputs to production such as labor, capital and inventoried items. Taxes paid are also a component of value added and hopefully reflect government services. Returns on land are another part of value added that are sometimes seen as rental proceeds. Value added is broken down differently in each input-output model, particularly the capital-related component which includes interest payments and profits that are retained or paid as dividends. IMPLAN, which will be described further in a later section, divides value added into four

[56]Realize that a row does not capture all of the sales of a sector's production; the balance is exogenous demand.

components: employee compensation, indirect business taxes, proprietary income and other property type income.

Final demand is also present in the transactions table. Unlike intermediate inputs, final demand is the end-use of the product. Examples of different sources of final demand are consumers, private investment, government and exports. Usually final demand is located in the column(s) to the right of the columns of intermediate inputs. The notation for final demand is Y_i when viewed as an aggregated total. Once final demand is given, output can be obtained by summing across the rows of the transaction table. Thus, $X_i = Z_i + Y_i$, where Z_i is the sum of the row's Z_{ij}'s.

V.3.3 The Input-Output Matrix and Direct Requirements Table

Once a transactions table is obtained, the next step is to calculate the *input-output matrix* or *'A' matrix*. The notation for coefficients in the A matrix is a_{ij}. These coefficients have a number of names in the literature, but are most commonly called the *input-output coefficients*, *technieal coefficients*, or *direct-input coefficients*. These coefficients reflect the weighting of the intermediate input as a portion of output, or $a_{ij} = Z_{ij} / X_j$. Like the Z_{ij} coefficient, the a_{ij} coefficient reflects a 'from - to' relationship. In the case of the direct-input coefficients, a_{ij} is the amount that sector j purchases from sector i per dollar of output in sector j.

Whereas the A matrix most commonly refers to an *nxn* matrix of the direct input coefficients for the production sectors, the *Direct Requirements Table* usually adds one or more rows for value added inputs. This addition allows the entire column of coefficients for any sector to sum to unity. Each column of these coefficients in the direct requirements table is sometimes called a *production function* in the literature, because it represents the proportions of inputs that go into output (MIG, Inc., p. 7).

The A matrix normally excludes all final demand and value added. A model with such an A matrix is called an *open* model. It should also be noted that the portion of value added that pertains to labor has an important impact on consumer demand, since wages fuel consumer consumption. Some models elect to endogenize the value added labor and final consumer demand components by treating them as a separate sector like the other industries, a sector usually called *households*. In these cases the households sector is usually placed in the far right column and bottom row of the A matrix. Endogenizing households in this fashion is referred to as a *closed* model, in contrast to open models where households remain exogenous.

V.3.4 Leontief Method

Leontief is credited with popularizing the powerful use of matrix algebra techniques in combination with input-output data. Using these techniques, output or production requirements can be forecast for a given change in final demand in one or more sectors, in a model with n sectors in total. In matrix notation the equation associated with this *impact analysis* is stated as:

$$X = (I-A)^{-1}\, Y$$

where X is an $nx1$ vector of output, I is an nxn identity matrix, A is the nxn A matrix and Y is the $nx1$ vector of final demand. The entire equation is called the *predictive multiplier model* by some practitioners (MIG, Inc., p. 9). The term $(I-A)^{-1}$ is called the *Leontief inverse* matrix or *matrix of multipliers*. The coefficients in the Leontief inverse matrix are often called the *direct and indirect input coefficients*.

A sector in input-output will sell its output either to other sectors as an intermediate input or to final demand. If the final demand for that sector's output is changed, then the sector's production changes accordingly. With a change in production, there is a change

in intermediate inputs required. This then changes the production levels of those sectors supplying these intermediate inputs and their requirements for intermediate inputs (which may include the original sector). This process continues in an iteration of succeeding smaller rounds of effects, all driven by the initial change in final demand. The power of the Leontief inverse is that it mathematically accounts for all of these rounds of effects.

V.3.5 Direct, Indirect and Induced Effects

Returning to the direct and indirect input coefficients, their name refers to the components of the successive rounds of effects present in the Leontief inverse: the *direct and indirect effects*. The direct and indirect input coefficients are also sometimes called *multipliers*, because of the multiplicativeness of these successive rounds of effects.

Direct effects pertain to the initial change. These direct effects may be the result of a policy change, a project, or any other condition that stimulates or curbs a measurable economic activity. This economic stimulus leads to a production change reflected in the interindustry or input-output accounts. Indirect effects refer to the successive rounds of interindustry purchasing that result from the initial change. The indirect effect measures this additional change from the direct effect due to backward linkages between firms[57].

The notation for the direct and indirect coefficients is d_{ij}. Each of these coefficients represents the production required by the i (row) sector to meet the 'needs' created by one unit of final demand for the j (column) sector. These needs are the total direct and indirect effects. Note that d_{ij} is greater than or equal to 1.0 for coefficients on the diagonal from the upper left to lower right corners. This is because at least one unit must be produced to meet final demand of one unit in that sector.

[57]For example, suppose another country revoked a tariff on U.S. tobacco that leads to an increase in demand for U.S. tobacco. The change in U.S. tobacco production from this policy change would be the direct effect. The ripple effect on suppliers of inputs to tobacco production and subsequent rounds of interindustry purchases and production changes is the indirect effect.

Open and closed models have a difference in their *total effects* from an initial change. In the open model the total effect is the sum of the direct and indirect effects. In a closed model, the total effect is the sum of the direct, indirect and *induced* effects. The induced effect in the closed model refers to the additional interindustry purchases and production that result from household spending changes. These spending changes are caused by a variation in household income brought on by the direct and indirect production effects. By removing households from final demand and putting them into the A matrix, the additional changes in the economy from household spending can be measured[58].

V.4 Assumptions and Limitations of Input-Output

Most applications of input-output include a section on the assumptions of input-output. Although stated, these assumptions do not always have the influence they should on the final results of an analysis. Therefore it is very important to understand the implications of these assumptions. Although there are a number of ways to present these assumptions, Miller and Blair provide an orderly analysis that incorporates economic theory (pp. 11-13).

The first assumption is present when the input-output matrix is created. Recall the input-output coefficients, or a_{ij}'s. These assume that the intermediate inputs supplied by sector i to sector j depend on the total output of sector j. That is, the amount of inputs used depends entirely on the level of output. The stronger assumption present is that this relationship does not change with the level of output of sector j; constant returns to scale are assumed. The implication of this is that economies (or diseconomies) of scale that may be present in these sectors are ignored, meaning that the model may be more inaccurate for large changes in output.

[58]To continue the previous tobacco example, part of the induced effect would be due to production changes resulting from a change in spending by tobacco farmers and their hired laborers.

A related second assumption of input-output relates to the mix of inputs used, or to the production function. An earlier assumption is that the relationship between an input and output is fixed. Another assumption is that the relationship between inputs is fixed. In other words, a sector will use intermediate inputs in the same fixed proportions regardless of the level of production. This condition is often referred to as unchanging technology. It also means that no factor substitution is possible. For economists, these two assumptions are reflected in 'L' shaped isoquants and a linear production function.

Broomhall and Johnson (1991) elaborate further on other assumptions implicit in these two assumptions. They note that these relationships, when combined with impact analysis, assume there are no capacity constraints (p. 79). Furthermore, input-output is a static model, so changes in demand are assumed to be instantaneous and production capacity exists to meet it. Individual preferences also do not change in a static model. The marginal propensity to consume for households remains constant, indicating fixed proportion consumption. Finally, prices are constant (p. 83). Capacity constraints do occur in an economy, so any impact analysis with large changes in output has to consider this factor. For many production processes input prices can move with a change in quantity demanded, and input substitution can occur at some change in level of production. Output prices and consumer demand will also usually change at different levels. Thus, care must be taken when evaluating the results of any impact analysis.

Hastings and Brucker (1993) add another consideration. They note that the in-region and out-of region "distribution of purchases and sales is fixed" (p. 10). Broomhall and Johnson note that this assumption can be a significant limitation in the case of a large change in demand. The supply relationships may change (at least temporarily) as more of the demand is supplied by out-of-region production, particularly in cases where supply within the region is at or near capacity or the within the region industry can not make

immediate adjustments (p. 83). To summarize,

> *in short, this model assumes that market structure, state of technology, relative prices and geographic distribution of economic interaction are fixed and that the supply of inputs and demand for output are elastic* (Hastings and Brucker, p. 10).

Another consideration when conducting impact analysis is the nature of change in an economy. Input-output assumes that change in an economy is demand driven. Other stimuli are not considered. In this regard, input-output is similar to economic base theory, which assumes "exogenous final demands drive the economy" (Siegel, Johnson and Alwang, p. 278). Input-output differs in that this final demand can be both internally and externally driven (with respect to the region), while economic base theory only considers externally driven demand (p. 278). Tobacco is an interesting application of the theory, because tobacco production is limited to certain areas of the United States. Furthermore supply is controlled, although partly determined by demand. These considerations will be weighed when using input-output to evaluate changes in the tobacco economy.

When discussing exogenous change, a somewhat related limitation arises for most input-output models used today. This is the limitation that the entire area outside the region studied is treated as exogenous. The distinction is that most input-output models are *regional* models, versus *interregional* and *multi-regional* models which behave differently[59]. Models such as IMPLAN that construct regional models, a model for only a single study area, face a measure called the *feedback effect* that is only accommodated in models with more than one region. Miller and Blair describe the feedback effect as *interregional feedback*, which they define as added demands on the region being studied due to interregional linkages (p. 59). They distinguish between a *spillover effect* and interregional feedback (p. 58). To apply their example in a hypothetical tobacco context,

[59]Miller and Blair can be consulted for more detail on interregional and multi-regional models. These models are not in common use because their greater data demands make them not feasible for most studies.

a spillover effect could occur when an increase in tobacco production in Virginia creates the need for additional production of North Carolina-produced chemicals used by Virginia tobacco growers. Interregional feedback is illustrated by the increased need by the North Carolina chemical companies for raw inputs to their production process that are produced in Virginia. Thus, even though Virginia does not produce the chemical, the economy gains from its increase in production. Single region models do not capture this effect and, thus, it is a source of error in their estimates.

The amount of error due to this missing feedback effect depends on the strength of the interregional linkages and the nature of the input-output coefficients in the other region(s). Miller and Blair noted that several studies have suggested that the size of these effects are relatively small. They generalize in saying that larger regions that are more self-sufficient will usually have smaller feedback effects (pp. 62-63). Many studies will not have such latitude in defining their region size, so this source of error should be considered in any evaluations made.

As noted earlier, the assumptions of input-output make it better suited for short-term analysis and hence the 'short-term' qualifier used in the title of this study. Such a qualifier places an emphasis on the limitations of the assumptions of unchanging technology and consumer preferences; a premium is placed on an unchanging structure of the economy. By working in the short-term, both of these limitations become less significant, because they are temporal processes of change. However, other arguments, such as capacity constraints and instantaneous response, point to a longer term outlook. This limitation can be moderated by considering the levels of change that are modeled. For very large changes, this becomes an important factor.

Lastly, another assumption that is relaxed in some input-output models is "homogenous products with no joint production" (Polenske and Fournier, p. 209). With this assumption

a sector is the only producer of a particular product, and it does not produce any *joint products*. *Secondary products* and *by-products* are other terms used interchangeably with joint products, although some schemes make a distinction in their utilization. Where there are secondary products, there is usually a designated *primary product* that is the emphasis of the industry's production. Clearly it is an unrealistic assumption to assume no joint products, and it may cause material mis-statement of production for some sectors. The use of the rectangular accounting framework addresses this problem.

V.5 Rectangular Accounting Framework

Most presentations of the theory of input-output contained within applied works end with the previous list of assumptions or even earlier, exiting after the presentation of the Leontief method. The assumption of no joint products is discussed in the previous section. This assumption is rarely stated in input-output studies. However, many of these studies use models that accommodate joint products; the no joint products assumption is relaxed.

In order to relax the assumption of no joint products, the *rectangular accounting framework* is needed (Polenske and Fournier, p. 213). Rather than making use of the technique of obtaining a square industry-by-industry $\boldsymbol{A}$ matrix directly from the transactions table, the rectangular accounting framework makes use of two tables, the *make table* and the *use table*, to create its own equivalent to the $\boldsymbol{A}$ matrix.

The make table, more commonly called the *make matrix*, shows the commodities made by each industry. The format of the table is industries for the rows and commodities for the columns. The sum of each row is that industry's *total industry output*. The sum of each column is that commodity's *gross commodity production*. The make matrix does not record the destination of commodity deliveries from an industry. The *use matrix* helps to complete this picture.

The use table or use matrix shows the commodities used by each industry. The format of this table is commodities for the rows and industries for the columns. The sum of each row is the *intermediate demand* for that commodity. The sum of each column is *gross industry commodity demand* for the respective industry. Note that purchases by an industry will not only be for production of its primary product, but also for any secondary products. Thus, if input-output coefficients are constructed for this table, they would not reflect the production technology for the primary product, but for the industry as a whole[60].

A simplified presentation shows the equivalency of this method to the previously introduced input-output technique. Calling the make matrix the $\boldsymbol{B}$ matrix, and the use matrix the $\boldsymbol{E}$ matrix, then "premultiplying $\boldsymbol{B}$ by $\boldsymbol{E}$ results in an industry-by-industry matrix" (Polenske and Fournier, p. 217). This industry-by-industry matrix is used in the same fashion as the $\boldsymbol{A}$ matrix. In other words, $(I-EB)^{-1}$ is used in place of $(I-A)^{-1}$ in the standard $X = (I-A)^{-1}\,Y$ equation[61].

V.6 IMPLAN Model

IMPLAN is an acronym for IMpact Analysis for PLANning. In 1994, three professors at the University of Minnesota made the claim that IMPLAN

> *is probably the most widely used regional impact analysis and forecasting system in the U.S. today* (Maki, Lichty and Loveridge, p. 1).

This stature reflects significant growth from IMPLAN's initial purpose of meeting the economic planning requirements of several federal government acts.

---

[60]This is not always the convention used. IMPLAN's use of an industry technology assumption is one example that will be discussed in a later section.

[61]Actual use of the rectangular accounting framework can be more involved. Chapter 5 in Miller and Blair provides more detail on the rectangular accounting framework.

IMPLAN was developed by the USDA Forest Service in 1979 as a main-frame computer application. The subsequent conversion of IMPLAN into a microcomputer application improved its accessibility and affordability, which partly accounts for its popularity today. Over time the Forest Service has relinquished its involvement as custodian of the IMPLAN system. Apart from the creation of the software, there is a continual upkeep required of data reflecting the current U.S. economy. At one point this responsibility passed to individuals at the University of Minnesota, the Minnesota IMPLAN Group. The current arrangement appears to have evolved into a private venture with some individuals common to the old and new groups. IMPLAN data sets are now purchased from MIG, Inc.[62]. The software used for this study is the DOS-based version 91-F developed by the Forest Service, still the most common version used.

V.6.1 Basic Features of IMPLAN

The IMPLAN software allows construction of regional models of the United States with the county as the base unit size[63]. Thus, regional models can be constructed for a county or any combination of counties. Sections V.6.2 and V.6.3 will discuss the process the IMPLAN software uses to create the regional models. In general, the starting point is a national input-output model prepared by the Federal Government from survey data. The second essential dataset is estimates of county level data currently prepared by MIG, Inc. that is consolidated by the IMPLAN software into the region specified. Then IMPLAN "adjusts the national level data to fit the economic composition and estimated trade relationships of [the] chosen region" (Martin, Radtke, Eleveld and Nofziger, p. 227). IMPLAN allows different *scenarios* of final demand change to be constructed after the regional model is constructed. These scenarios are used with the regional model to

[62]The Land Management Planning Group of the Forest Service provided financing and technical support for the 1990 database created by the University of Minnesota. The 1992 database used by the study was created by MIG, Inc.

[63]Virginia's independent cities are an exception. They are treated similar to counties as base data units.

estimate the direct, indirect, and induced effects of changes in regional final demand and to create various common multipliers for the region.

Section V.6.2 will further discuss IMPLAN's use of a uniform production technology and the implications of this assumption. How regional or county-level data are prepared by MIG, Inc. and then constructed into regional models by the IMPLAN software is discussed in section V.6.3. The section after that discusses regional purchase coefficients, an important factor in regional model construction and accuracy. Section V.6.5 discusses the unique way the IMPLAN software calculates the induced effect; households are not made endogenous in the typical closed model calculation of the induced effect. Lastly, section V.6.6 discusses the creation of scenarios, the IMPLAN technique to find regional estimates for the impact of a prescribed change. Multipliers, which are not unique to IMPLAN, are discussed in section V.7.

V.6.2 National Production Function

As noted previously, IMPLAN uses the national input-output model in the construction of the regional model. MIG, Inc. forms their own *national structural matrices* by formatting the most recent national model to match the IMPLAN sectoring scheme. Another step for MIG, Inc. is to "price adjust" the data to the model year they are creating (MIG, Inc., p. 31). The 1992 dataset will be used for this study. This dataset uses base national data from the 1987 Benchmark Input-Output Model prepared by the National Bureau of Economic Analysis[64] (p. 31).

The national structural matrices needed for further calculations of the regional input-output accounts are the national make and use tables. These are the same format as the make and use tables introduced earlier. The national use table or *national use matrix*

[64]Datasets prepared just prior to the 1992 dataset used the 1982 Benchmark Input-Output Model (Lindall, February 1995, p.2). The 1987 model is the most current national data available at this time.

adds value added figures so that each column of industries can sum to the national total industrial output for the industry. Likewise the industry rows of the national make table or *national make matrix* sum to the national total industrial output, but no additional data are required.

A *national byproducts* table and *national absorption* table are conversions of the national make and use matrices, respectively, into coefficient form. Both tables simply convert all of the elements to a proportion of each industry's national total industrial output. These two tables are then used with regional data to create the *regional social accounts*, covered in the next section.

Each industry column in the national absorption table represents a production function (MIG, Inc., p. 33). These production functions represent national technology for the sector or national averages. Obviously, these national averages will not reflect regional technology when there are regional differences. In agricultural sectors these differences can be significant due to different regional production practices, even for relatively homogeneous crops. Another source of difference in agriculture is when crops are not homogeneous (they differ by type), but are still aggregated and reported in one sector rather than making unique sectors for each crop. Tobacco is a case in point with burley and flue-cured having different production technologies and production regions. Nevertheless, there is only one sector for tobacco in the IMPLAN model and it reflects an 'average' of both types.

The dataset used with IMPLAN does not contain a survey-based regional production function for each sector. Production functions are regionalized only to the extent that the

value added portion comes from regional data. The relative weighting between industrial sectors in the regional models uses the national production function proportions[65].

The national production function can be changed to a user-defined regional production function, but the procedure must be done outside IMPLAN's menu-driven system. The MIG Technical Analysis Guide calls this procedure "cumbersome", but with care and tenacity it does work (MIG, Inc., p. 64). Chapter VI will describe production function changes made for this study.

V.6.3 Regional Accounting Data

The IMPLAN database consists of 21 economic and demographic variables at a 528 industrial sector level for all 3,000 counties in the United States[66].

-- Lindall and Olson, 1993, p. 1.

Regional data are another dataset required by IMPLAN for the construction of the regional model. There are a number of documents that describe how regional data are gathered or estimated, and then formulated for use by IMPLAN. Perhaps the most thorough is "Micro IMPLAN 1990/1985 Database Documentation" (Lindall and Olson, 1993). A briefer, but more current account is the "MIG Technical Analysis Guide" (MIG, Inc.). To realize the immensity of the task of creating county-level datasets, note that employment, earnings and federal purchase data are the only data available at the county level (Lindall and Olson, 1993, p. 7). Add to this the fact that non-disclosure requirements on federal data create gaps in the existing data that have to be filled. However, different techniques combined with the availability of data at the state and national level allow allocations to be made that provide the data required at the county-level.

---

[65]The next section will explain how a 'semi-regional' production function for each sector is calculated using actual regional value added figures for each sector.

[66]For the curious, there are not exactly 3,000 counties in the United States. A separate source noted 3,124 counties in the United States are covered by the IMPLAN dataset (Maki, Lichty and Loveridge, p. 1).

Agriculture poses unique problems for creating county-level data. The problem with agriculture is that it does not have the county-level employment and earnings data used for other non-agricultural commodities (Lindall and Olson, 1993, p. 10). Complicating the issue is that many agricultural statistics are compiled at the farm level. Past databases have used the Census of Agriculture to derive the figures needed. Lindall and Olson cautioned in the 1990/1985 database documentation that "since the agricultural data are entirely derived, we strongly encourage people with better agriculture data to use it in building their IMPLAN models" (1993, p. 11).

More recently, a MIG, Inc. newsletter indicates that beginning with the 1992 dataset "agricultural output values are controlled to the USDA Economic Research Services Crop and Livestock production estimates" providing better results than Agriculture Census figures (Lindall, May 1996, p. 4). It is unclear whether the concern about the derived nature of the agriculture figures is entirely removed. The newsletter further explains:

> *IMPLAN agriculture employment and income data are estimated two ways. For farms that pay wages, the ES202 wage and salary data and employee compensation to industry output ratios from BEA Benchmark tables are used. This is combined with the estimates of proprietors and proprietary income. Proprietary income is estimated by income per farm and number of farms from the Census. The IMPLAN employment and income estimates are then controlled to the farm numbers from the Regional Economic Information System (REIS)* (p. 4).

Proper allocation of both wage income and proprietary income is important for a commodity like tobacco that has both incomes. Chapter VI will discuss the implications of different spending patterns for the mostly migrant wage laborers and resident proprietors using income from tobacco production.

The variables IMPLAN provides for each sector in a county can be divided into those that pertain to commodities and those that pertain to industries. Commodities have two categories: final demand and sales. Industries have three categories: value added,

employment and total industry output. The final demand category has 11 elements. Three of these elements are different income levels of *personal consumption expenditures,* or PCEs, that are final demand by households and individuals. There are two state and local government expenditure elements and two federal government expenditure elements. An element for commodity credit is no longer used (Lindall, February 1995, p. 2). The remaining three elements of final demand are inventory purchases, gross private capital formation and foreign exports. These 11 final demand elements are summed to one of the totals provided: total final demand. The 'sales' category is actually treated as institutional supply and thus increases regional supply of a commodity (MIG, Inc., p. 29). Sales has three elements, state and local government sales, federal government sales and inventory sales. Value added contains four elements previously provided in section V.3.2, plus a total that sums these elements. The employment category has only one element, and it measures total jobs. These are not measured in full-time equivalents, but reflect full and part-time jobs in the industry sector. The last category also has only one element, total industry output, which reflects gross industry sales from production (Taylor et al, pp. 3-18). All of these elements represent the regional data that has to be collected or estimated by county for the IMPLAN model (currently done by MIG, Inc.). As an example, Table 5.1 provides these elements for the Southside *study region* for two sectors: tobacco and stemming and redrying.

Table 5.1 Example 1992 Regional Accounting Data for the Southside *Study Region*

Element	Tobacco ($ Million)	Stemming and Redrying ($ Million)
PCE - Low	0	0
PCE - Medium	0	0
PCE - High	0	0
State & Local Gov. Expenditures - Education	0	0
State & Local Gov. Expenditures - Non-Education	0	0
Federal Gov. Expenditures - Non-Military	0	0
Federal Gov. Expenditures - Military	0	0
Commodity Credit	0	0
Inventory Purchases	0	6.899786
Gross Private Capital Formation	0	0
Foreign Exports	63.532430	12.815010
Total Final Demand	63.832590	19.714800
State and Local Government Sales	0	0
Federal Government Sales	0	0
Inventory Sales	0	0
Employee Compensation	11.955580	45.031370
Indirect Business Taxes	1.553917	1.422480
Proprietary Income	13.674690	2.222213
Other Property Type Income	29.859960	135.062100
Total Value Added	57.044150	183.738200
Total Employment (thousands of jobs)	5.455000	1.442000
Total Output	114.076000	725.131900

Note: These figures are taken directly from IMPLAN prior to any user changes to IMPLAN data. All of the figures are in millions of dollars except employment which is in thousands of jobs. There are some rounding differences present in the totals found in the table.

Once the regional data are collected, the IMPLAN software can calculate the regional social accounts for the chosen region. The following narrative describes the most important steps and assumptions used in creating the regional accounts[67].

[67]If a more detailed step-by-step description with matrix examples is needed, a number of sources can be consulted: "Constructing Regional Social Accounts: An Annotated Guide to IMPLAN", "IMPLAN Companion Guide", or "MIG Technical Analysis Guide".

The goal in calculating the regional accounts is a regional industry-by-industry matrix like the A matrix described earlier. Recall that multiplying the use and make matrices results in a similar industry-by-industry matrix. IMPLAN does essentially the same thing[68]. Multiplying the *regional market shares matrix* by the *regional absorption matrix without imports* yields the desired regional industry-by-industry matrix. However, a number of intermediate steps and assumptions take place in reaching this point.

The regional market shares matrix is derived from the national byproducts matrix discussed earlier. An intermediate step is to obtain the *regional make matrix* which is calculated by multiplying the national byproducts matrix by a vector of regional total industrial output. The regional make matrix is then converted into the regional market shares matrix by calculating commodity coefficients. These coefficients are the make matrix numbers divided by the total *regional commodity supply*. The latter figure not only includes industrial commodity production, but inventory sales and governmental contributions (MIG, Inc., p. 35). The assumption implicit in this entire process is that regional production of commodities by industries is identical to the nation as a whole.

Derivation of the regional absorption matrix without imports is more complex than the regional market shares matrix, and it incorporates several assumptions. There are basically two stages to this process. The first stage goes from the national absorption matrix discussed earlier to the *gross regional use matrix*. The second stage converts this regional use matrix into the regional absorption matrix without imports.

To begin the first stage, recall that regional production function data are not surveyed. However, the value added component of the production function is compared with regional data. When national and regional value added proportions of the production

[68]There is quite a bit more to the IMPLAN model. A number of other matrices and totals have to be calculated to ensure the regional social accounts balance. Some of these include final demands, competitive and non-competitive imports, etc.

function differ, adjustments must be made on the remaining portions of the production function (intermediate input use) so that the proportions still sum to unity. An assumption made in this adjustment process is that any changes are prorated evenly across intermediate inputs. Note that it may be an inappropriate assumption if the regional value added difference is due to labor substitution with a particular input. The adjustment process creates the *gross regional absorption matrix*. This matrix is then multiplied by a vector of regional total industrial output to obtain the gross regional use matrix.

To begin the second stage, note that the gross regional use matrix includes imported inputs. Here *imports* refer to inputs from outside of the region, which may be the neighboring county if it is not part of the region being studied. The next step removes these imports. However, it is not such an easy process to do this since published figures of these trade flows are not generally available at this level. *Regional purchase coefficients* (RPCs), explained in the next section, are factors used to remove imports. RPCs form a vector that is multiplied with the gross regional use matrix to obtain the matrix of *regional commodity demand without imports*. This is then converted into the desired regional absorption matrix without imports by calculating coefficients of total industrial output by sector.

The derivation of the two components that are multiplied to obtain the regional industry-by-industry matrix, the regional market shares matrix and the regional absorption matrix without imports, has been explained. However, two important assumptions in this derivation have not been discussed. The first is referred to as the *market shares hypothesis*, which says that purchases of a commodity will be made from each industry in the proportion or market share of that industry's production of the commodity for the economy as a whole (Ecosystem Management Staff, p. 23). The second assumption is the *industry technology assumption*. For IMPLAN this is a different assumption about

the industry production function than for standard models. Each industry sector uses the production function or technology of the primary product; all secondary products must use the primary product's mix of inputs (MIG, Inc., p. 43). The industry technology assumption is not a hindrance to the two sectors that will be the focus of this study. The tobacco and tobacco stemming and redrying sectors do not have significant secondary products.

V.6.4 Regional Purchase Coefficients

The previous section explained how regional purchase coefficients, or RPCs, are used to remove imports in the calculation of regional commodity demand without imports. Thus, RPCs are

> *defined as the proportion of gross regional commodity demand fulfilled by commodities supplied by producers within the region* (Siverts, Alward and Maki, p. 10).

RPCs are probably one of the most widely discussed topics in input-output literature. The extent of RPCs' importance to the accuracy of input-output, and the best way to calculate them, generates lively discussion amongst aficionados. This section will first explain in more detail how IMPLAN uses RPCs. Next it will discuss the historical development of RPCs and the current methods used for estimating the IMPLAN RPCs. Lastly, the ability for users to evaluate the furnished RPCs and change them as needed is discussed.

Before RPCs are applied, IMPLAN will evaluate regional *trade flows* in order to establish an upper limit for each sector that the estimated RPCs can not exceed. To be able to do this, IMPLAN first calculates two sectoral totals: *net regional commodity supply* and *gross regional commodity demand.* These calculations require the use of elements of the regional data, or regional social accounts, described in the previous section. Net regional commodity supply sums down the columns of commodities in the

regional make matrix, adds all three sales elements, and subtracts the foreign exports element. Gross regional commodity demand sums across the rows of commodities in the regional use matrix and adds all of the elements of final demand except for foreign exports. Each commodity sector's net trade flow is calculated by subtracting that sector's gross regional commodity demand from net regional commodity supply.

Once these two sectoral totals are calculated, IMPLAN can calculate a *supply/demand pooling ratio* that serves as the upper limit for the estimated RPCs. This ratio is calculated by dividing net regional commodity supply by gross regional commodity demand. The supply/demand pooling ratio is set equal to 1.0 if its calculated value is greater than one. Supply/demand pooling operates differently than RPCs in that it assumes that all demand is met by local supply first. A ratio of 1.0 means all local demand is met by local supply and thus all supply in excess of demand is exported. If a factor greater than 1.0 is multiplied against the gross regional use matrix, then the regional commodity demand without imports (demand met by local supply) would be overstated, thus the need for the rule noted earlier. To establish the upper limit the estimated RPC is compared with the supply/demand pooling ratio. The estimated RPC is used except when it exceeds the supply/demand pooling ratio. If the latter condition prevails, the supply/demand pooling ratio is used, establishing an upper limit. The ratios resulting from this comparison are called *model RPCs*, and these are the RPCs used in the calculation of regional commodity demand, discussed earlier (MIG, Inc., p. 39).

At this point it is probably helpful to illustrate how trade flows and RPCs integrate. An example is presented in Table 5.2, which shows IMPLAN generated figures for 1990 and 1992. The figures are those provided by IMPLAN before any alterations to the data have been made. The contrasting years demonstrate the basic techniques of the calculations. One can see how the RPC is used to find commodity imports and how domestic exports is essentially a 'plugged' figure that makes supply and demand balance.

Table 5.2 IMPLAN Trade Flows for Tobacco, Sector 15, Southside *Study Region*

	1990 ($ Millions)	1992 ($ Millions)
Regional Purchase Coefficient (RPC)	.10423	.11532
Supply/Demand Pooling Coefficient		
Gross Regional Commodity Output	91.1029	111.0248
Less: Foreign Exports	0.0950	63.5324
Net Regional Commodity Supply	91.0079	47.4924
Gross Regional Commodity Demand	427.0955	411.8471
Less: Commodity Imports	382.5800	364.3547
Net Regional Commodity Demand	44.5155	47.4924
Plus: Domestic Exports	46.4924	0
Total Regional Commodity Demand	91.0079	47.4924
Calculations:		
Net Regional Commodity Supply	91.0079	47.4924
divided by Gross Regional Commodity Demand	427.0955	411.8471
Supply/Demand Pooling Coefficient	.2131	.1153
Gross Regional Commodity Demand	427.0955	411.8471
x (1-RPC)	.8958	.8847
Commodity Imports	382.5800	364.3547
Net Regional Commodity Supply	91.0079	47.4924
Less: Net Regional Commodity Demand	44.5155	47.4924
Residual Domestic Exports	46.4924	0

Note: Figures are in millions of dollars except for the RPC and supply/demand pooling coefficients. All figures are taken directly from IMPLAN except for the supply/demand pooling coefficient, which is calculated.

One interesting result is that it appears that the presence of foreign exports in 1992 has caused the supply/demand pooling limit to have gone into effect. The RPC value given in the table for 1992 is the same as the supply/demand pooling coefficient. This raises the issue of how foreign exports are allocated. For each commodity, IMPLAN makes an

allocation of both U.S. foreign exports and imports according to the region's share of U.S. production. This contrasts with the use of RPCs for estimating regional domestic exports and imports. Maki, Lichty and Loveridge (1994) call for an improvement in the IMPLAN model to use the RPC technique for foreign exports and imports as well (p. 4).

A 1985 journal article by Harry Richardson traces the evolution of RPCs up to that point in time. In general, the need for RPCs arose because survey data providing detail on the proportion of regional commodity requirements met by regional supply did not (and still does not) exist. These trade flows are needed to regionalize national input-output models (as IMPLAN's does). Thus, different alternatives for estimating these trade flows are developed. Richardson discusses a number of these alternatives, including location quotients and supply/demand pooling. Both of these estimates are found to be problematic. In particular, *cross-hauling*, a condition where the same commodity is imported and exported from a region, causes problems for both techniques (Richardson, 1985, pp. 621-622). A new technique using regression methods to estimate trade flows begins to address the cross-hauling issue. This technique was pioneered at the Regional Science Research Institute in the late 1970s and early 1980s and is the forerunner of today's technique. Known trade flows are available for some sectors and regions, and these are used as dependent variables in the regression model. The model then adds other variables such as "agglomeration economies, relative wages, weight-value ratios, and other locational determinants" in arriving at the estimates where trade flow data does not exist[69] (Richardson, 1985, p. 615). Richardson has a very hopeful opinion toward these

[69]A number of articles by the Regional Science Research Institute (RSRI) team explain their regression technique. "Estimation of Regional Purchase Coefficients and Their Use in the Construction of Non-survey Input-Output Impact Models" is a RSRI discussion paper published in September, 1980 by Stevens, Treyz, Ehrlich and Bower about this work. The references section of that paper discloses a previous RSRI discussion paper by the first three authors in 1979. This may have been the first release of work on their RPC estimation technique. Another commonly referenced work of the period is the article "Error Generation in Regional Input-Output Analysis and its Implications for Nonsurvey Models" by Stevens and Trainer published in 1980 in a book edited by Saul Pleeter.

techniques in 1985, but is concerned that

> *its operational future may be limited by the Census Bureau's decision to abandon the interregional trade flow data collected in the 1977 Census of Transportation* (p. 623).

Richardson's concern has proven to be very omniscient. IMPLAN originally used a form of supply/demand pooling for estimation and later switched to regression estimated RPCs. Literature providing the regression equations used by IMPLAN could not be located. However, the IMPLAN literature does indicate some of the source data used for the generation of the estimates. Current RPC regression estimates continue to make use of older survey data. Specifically, the 1977 Multiregional Input-Output Accounts (MRIOA) containing separate interstate trade flows for 125 sectors continues to be used (MIG, Inc., p. 60). Obviously these are more aggregated than IMPLAN's 528 sectors[70]. Add to this the fact that "parameters for the RPC predictive equation were calculated for the first 24 sectors" of the 125 sector MRIOA data, and one begins to see the true estimate nature of the RPC calculations[71] (p. 60). New trade flow data created by Jack Havens at Boston College is being used for the state values for the service sectors (p. 60). It is unclear whether this is new survey data or a revision of the original MRIOA data.

The future for RPCs derived from better source data is more hopeful. It appears that the Bureau of Census conducted a 1993 Commodity Flow Survey that is anxiously awaited. A recent MIG newsletter indicates that RPCs are a "subject of continual discussion" and that a new set of RPCs will be created once the data are available (MIG, Inc., p. 60; Lindall, May 1996, p. 5).

---

[70]An unpublished table of revised RPCs prepared by Jack Havens of Boston College using the MIRO sectoring scheme indicates the nature of the MRIO aggregation. The IMPLAN tobacco sector is derived along with 4 other IMPLAN sectors from the MRIO category 'Cotton, Grain, Tobacco'.

[71]The opinion on the nature of the RPC estimates is the author's. MIG, Inc. is responsible for the quoted section.

How important are RPCs? This is a matter of debate. Maki, Lichty and Loveridge briefly note that the formula lacks variables to adequately account for "regional variations in spatial-economic structures", a "serious deficiency of the current model" (p. 4). MIG, Inc. still chooses to quote: "Stevens and Trainor [sic, s/b Trainer] (1980) note that estimating regional trade flows (imports and exports) across regional boundaries is perhaps the largest source of error in deriving non-survey I/O models. Use of Regional Purchasing Coefficients (RPCs) is one way to eliminate some of the bias inherent in non-survey models" (MIG, Inc., p. 59).

Use of the Stevens and Trainer study in such a fashion should be put back in the context of the time the article is written: when location quotients and supply/demand pooling are being used and the regression techniques estimating RPCs are just being pioneered. The question then becomes whether, even after the continued development of RPCs, estimation of trade flows is still the largest source of error today. The fact 1977 data are still being used means that the accuracy of the estimates is probably declining with passing time. A reading of the same Stevens and Trainer article suggests that the developers of these techniques still believe that limited surveys of purchase data should be undertaken for regional models, particularly the distribution of the first round effects (pp. 81-82). They also conclude with a plea for more census surveys so their estimates can be tested. When the 1993 survey is finally released, perhaps this plea will be answered.

Not everyone agrees with Stevens and Trainer. Giarratani and Garhart (1991) survey the debate. They state that Stevens and Trainer's findings indicate incorrect RPCs generate more error than incorrect input-output coefficients (Giarratani and Garhart, p. 23). An early challenge to this result is made by Garhart using his own simulation techniques (p. 24). He found RPCs only generate more error for open models, while input-output coefficients cause more error for closed models (p. 25). Giarratani and Garhart conclude

that, while RPCs may be important, "the key for successful model building lies in understanding the characteristics of the study region" (p. 46). Added to this is a recommendation suggesting more emphasis on improving important coefficients and in recognizing how closure of a model with respect to households effects overall model performance (p. 46). Another similar conclusion from the other side of the debate comes from one of the developers of the RPC estimation technique. An article by Treyz (1993), "Policy Simulation Modeling", indicates his concern about too much focus on RPCs and not enough on the assumptions of input-output and the structure of simulations being created (p. 172, pp. 177-178).

What happens if RPCs are inaccurate? Two members of the original RSRI team, Stevens and Treyz, return with the help of a newcomer, Lahr, to provide a response in an article in a book published in 1989. They note that:

> *RPCs determine the extent to which indirect and induced purchases become actual changes in the outputs of a region's industries. Thus, over- or underestimation of RPCs will cause over- or underestimation of secondary feedback effects on the regional economy* (Stevens, Treyz and Lahr, pp. 245-246).

This means that if RPCs are overestimated, then multipliers will be overestimated[72]. RPCs are one factor determining the strength of existing regional interindustry linkages. A lower RPC for a sector indicates more leakages in the regional economy as more of the commodity is imported. Regional planners use RPCs as one tool in helping to identify *regional import substitution strategies*. Finally, lower regional RPCs mean that the direct, indirect and induced effects from an economic change will also be lower. To relate this to tobacco, if market changes lead to less regional production, the impact on the region will be mitigated by lower RPCs, causing more of the effect to be felt outside

[72]Stevens, Treyz and Lahr also noted that their testing confirms that their RPC estimation is preferable to location quotients and supply/demand pooling, but they close with a less than reassuring stance on the accuracy of the estimates, saying they are doing the best they can with the data they have. Once again, they note recent census data does not meet their needs (p. 253).

the region.

Fortunately, IMPLAN allows users to enter their own RPC estimates for each sector if they believe they have better information about trade flows. An analysis of trade flows and RPCs will be included in Chapter VI in order to see if any modifications of IMPLAN data are required.

V.6.5 IMPLAN Specific Accounting - The Induced Effect

The induced effect, and how it is typically derived from a closed model where households are endogenous, is described earlier. IMPLAN calculates an induced effect for households, but by a different means. This section will discuss how IMPLAN calculates its induced effect, how it differs from ordinary induced effects, and the resulting considerations to be made during the analysis stage.

Multipliers will be discussed in more depth in the next section, but some multiplier terminology is required here. *Type I* multipliers are associated with open models, while *Type II* multipliers pertain to models closed with respect to households. *Type III* multipliers refer to IMPLAN's alternative calculation of the induced effect present in Type II multipliers (and absent in Type I multipliers) without closing the model. A further distinction should be made at this time. The application of Type III is not universal. Miller and Blair describe Miernyk's Type III multiplier. His multiplier still makes use of a model that is closed with respect to households, but it differs from Type II models by differentiating between new residents and existing residents because of their different marginal spending patterns. Miernyk's Type III multiplier also provides different income levels for the existing residents. These Type III multipliers are smaller than the Type II multipliers and are created to better estimate the induced effect (Miller and Blair, p. 110).

The Micro IMPLAN User's Guide states that the IMPLAN Type III multipliers are a "modification" of the Miernyk Type III multipliers (Taylor, et al, p. E-2). While their intention may be similar, they are different because the IMPLAN Type III multiplier does not calculate the induced effect with a closed model, but rather retains the open model structure. In order to simulate the induced effect from additional consumer spending, an alternative approach is taken that estimates an additional final demand change. In its simplified form, IMPLAN finds the population change resulting from the direct and indirect effects of the economic change. This population change is multiplied by an average regional per capita consumption to find an additional final demand. To obtain the induced effect, this additional final demand is multiplied by the Leontief Inverse. This procedure is repeated for successive rounds of additional final demand until the population change is less than ten people (p. E-2).

Recall that one of the assumptions of input-output is that households have a constant marginal propensity to consume and fixed proportion consumption. A Type II induced effect applies this assumption when there is additional income from the direct and indirect effects. Regardless of the level of income change, consumption will continue to increase in direct proportion to the income change without change in types of spending (a linear relationship). There are fairly obvious differences in this behavior from the real world. The IMPLAN Type III induced effect described above tries to overcome some of the linearity of this relationship. Rather than providing the change in income (for a change in output) to the same people who consume ever greater proportions of the same commodities, IMPLAN converts the change in output to new employment. While this outwardly sounds preferable, it has somewhat an identical linear relationship. Part of the reason for this contention is because of the added IMPLAN assumption of full employment made by IMPLAN[73] (MIG, Inc., p. 45). Actual computational differences are mostly due to differences related to the conversion using sectoral employment

[73]The opinion is the author's, while the reference refers to the full employment assumption.

creation ratios and sectoral per capita consumption averages, rather than with the change in relationships.

An assumption made in calculating the population change is that the population increase is calculated based on the average number of people per job present in the economy before the economic change. This means a new job creates the same population growth regardless of the sector. On top of this, all new jobs spend at the previous regional per capita average (MIG, Inc., p. 47). Thus, IMPLAN does not differentiate between economic change in a sector that generates low-wage jobs and one that generates high-wage jobs. Perhaps it is not realistic for a small regional economy undergoing significant structural change to assume these averages.

An interesting development in the IMPLAN model is a changing opinion of the accuracy of the Type III calculation of the induced effect. A January, 1993 version of the Micro IMPLAN User's Guide says that IMPLAN does not use the Type II calculation, because it generally overestimates the induced effect (Taylor, et al, p. E-1). Furthermore, Type III multipliers are 5 to 15 percent less than their Type II equivalent (p. E-2). The more recent MIG Technical Analysis Guide reverses this conclusion. It cites two references and "anecdotal evidence" that suggest "in general, Type III multipliers tend to be higher than Type II" (MIG, Inc., p. 47). MIG, Inc. provide further reasons for potential overstatement in the Type II and Type III multipliers, closing with a bid for their software and datasets currently under development that will provide needed improvements[74] (p. 61). They are more immediately helpful in several subsequent sections. One example points out the importance of commuter patterns on calculations of the induced effect, stating that the study region should encompass the "labor force directly involved" (p. 63).

[74]The viewpoint that Type II multipliers provide overestimates is not universally held. Many analysts still believe that they are conservative. One analyst notes that Type II multipliers can cause serious underestimates because they do not incorporate the "role of investment and state and local government in the regional economy" (Conway, p. 190).

Surprisingly, they suggest that the best solution to the induced effects problem may be to use an alternative to the IMPLAN Type III induced effects (p. 62). They provide an example that simulates the induced effect by constructing a separate scenario of final demand change (pp. 80-82). The appropriateness of this suggestion for this study will be considered in the next chapter.

V.6.6 Scenario Development

The previous section closed with a call for a separate scenario in IMPLAN for the economic change being simulated. What exactly are IMPLAN scenarios and what options do they provide the user? An IMPLAN scenario describes changes in final demand for a model. Scenarios are used to conduct an impact analysis, showing the results of the change in final demand on the regional economy. The Micro IMPLAN User's Guide is like most software manuals in that it walks the user through the set-up of a scenario, but it provides little guidance on how to design a scenario. Applications in the literature also fall short in describing the details of their scenario set-up. This section will describe some of the important decisions that have to be made when a scenario is designed. Other important options that can also be used will be described.

In the IMPLAN model a number of construction stages must be completed before set-up of a scenario is initiated, including the creation of multipliers from the base data in the model. The User's Guide warns that some forms of impact analysis need to be conducted in these earlier stages, prior to the set-up of the scenario. In this regard, three forms of change are categorized: structural, technological, and trade (Taylor, et al., p. 4-1). Many aspects of the technological and trade changes have been previously discussed[75]. Structural changes refer to adding or deleting sectors to/from the region, or modifying

[75]Technological changes mostly refer to changes to the production function. Trade changes include modification of the regional purchase coefficients. Trade changes may also include modification of the actual regional sector accounts, such as foreign exports, that are provided in the IMPLAN database.

social account information for a sector (p. 4-1). This study will not make any changes reflecting structural adjustments.

Provided that all the necessary changes described in the previous paragraph have been made, scenarios can be constructed and an impact analysis conducted. A scenario in the IMPLAN framework is the highest level in a hierarchical structure. Components of a scenario are one or more *activities*. Each activity in turn is made up of one or more *events*. Reversing the order and building bottom-up, each event details a transaction at the sector level. Activities, then, are the sum of all the sectoral transactions. The idea is that activities should group events that are related to the same expenditure, or can be defined under the same unit of measure, because scaling the size of the total expenditure is controlled at the activity level (Taylor, et al. p. 4-2, 4-9 and 4-17).

A simple and incomplete example will illustrate the basic concepts. Suppose the impact of a farmer initiating tobacco production on fallow land will be modeled. Two activities might be established: one for the purchase of specialized farm equipment, and the other to cover the production costs of growing the tobacco. The equipment activity may only have one event linked to the supplying sector for the amount of the purchase. The production activity would likely have a number of events such as chemicals, fertilizer, fuel, and other inputs that are linked to their respective supplying sector. The amount assigned to each sector may be based upon a crop budget for one acre. The advantage then of having two activities is that, when the scenario is run, the equipment activity may remain scaled at "1", while the production activity can be scaled for different acres of production. It is easy to see how this scaling becomes important in modeling different policy scenarios.

Of course there are other reasons for grouping events into activities. One reason is that it aids construction of different scenarios by allowing activities created in other scenarios to

be used again. A technical reason for having different activities under a scenario is that they may have different defining characteristics, or fields of required inputs, when an activity is created. One such field is the *transaction basis* which controls whether all of the events under the transaction have transactions that are purchased as a commodity or from an industry (Taylor et al., p. 4-8).

Two important choices made when entering events are sometimes limited by the transaction basis chosen at the activity level. Recall that the event assigns a transaction to a sector. The choices available for selection are dependent of whether a commodity or industry transaction basis is selected. Another choice is the *accounting basis*, which is a selection that interprets the transaction amount of the activity as either being in producer prices or purchaser prices. If the transaction basis at the activity level is industry, then the only acceptable choice is producer prices (p. 4-12).

If the accounting basis selected is purchaser price, a subscreen is available for editing IMPLAN information used to remove the *margin* from the purchaser price to revalue it at producer prices[76] (MIG, Inc., pp. 14-15). Margin covers the additional mark-up over producer price that covers transportation, wholesale and retail returns. IMPLAN can only operate with producer prices. The IMPLAN subscreen allows these markups to be assigned to the appropriate sectors. Adjustment for this margin is an area that some analysts believe requires more attention. After discussing many areas of adjustment required in IMPLAN, one paper notes:

> *Overlooked, however, is the further regionalization of the final local sales accounts and the industry margins that convert industry output from producer prices to purchaser price. This process requires detailed, regionally-differentiated estimates of final product sales to households, governments and businesses* (Maki, Lichty and Loveridge, p. 5).

[76]According to MIG, Inc., IMPLAN only provides information on margin values typical for households. These values are available only if the activity is "commodity", "households" is selected for the "who" input field, and the event is set as "purchaser price". Other options will not have margins associated with them.

Continuing the preceding tobacco scenario equipment activity example, the activity would require a commodity transaction basis. Rather than assigning the single event under this activity to the retail sector where the equipment is purchased, the event is assigned to the original manufacturing sector with a purchaser price accounting basis. Margins provided by IMPLAN for the commodity can then be accepted or modified.

Somewhat related to margins is another adjustment of prices that needs to be considered. Prices may be for years other than the year of the model data, which is the 1992 dataset for this study. The most normal situation is to have an IMPLAN model year dataset that is an earlier year than that for the prices being used. In these cases the prices need to be deflated to the model year prices. The software has features for doing this deflation of prices internal to the model, but deflator data are not always available to use this feature. Practically speaking, the price deflation is done outside of IMPLAN using the consumer price index or other relevant index.

The issue of scaling is raised above. The feature of IMPLAN that allows this scaling, or assignment of activity levels, also provides another level of control on regional supply for each activities purchases. Recall that RPCs, the level of control discussed previously, are part of the IMPLAN dataset, are unique for each sector, and can be modified by the user. The additional level of control added to the activity scaling is local purchase coefficients (LPCs). A yes or no input for LPCs determines whether each event under the activity will use the RPCs (a yes response) or will be treated as if all of the purchase is supplied locally. Even further user control is possible with LPCs. If desired, a user defined RPC level can be defined for each event that is applied for that activity only (Taylor, et al., p. 4-17). Thus, another activity in the same scenario could still use the original RPC value[77]. This gives the analyst a high level of control over regional supply for separate purchases from the same sector.

[77]Another implication of LPCs is that interindustry purchases still use the RPC value.

The IMPLAN software also has two features that provide 'pre-built' activities (Taylor, et al., pp. 4-25 - 4-26). The first option allows the user to choose an industry (by sector number), and IMPLAN will build an activity that creates events using the industry's production function. In other words, sectoral events are created using each sector's proportion in the gross regional absorption matrix for the industry selected. The second option is similar, except it creates an activity chosen from a list of institutions. While this list contains different choices for federal and state governmental purchases and those by other institutions, arguably the most useful selection is for personal consumption. IMPLAN actually allows a choice between three different personal consumption types based upon income levels of consumers: low, medium and high. For the income level chosen, an activity is created with events that represent the expenditure pattern of consumers for that income level[78]. Recall that these personal consumption expenditure patterns, also known as PCEs, are 3 of the 11 elements in final demand.

The potential for simulating the induced effect with a scenario rather than using the IMPLAN Type III induced effect calculation, is discussed earlier. The alternative demonstrated in the MIG Technical Analysis Guide builds an activity by retrieving the PCE Medium Income institutional selection (MIG, Inc., pp. 80-81). In their example they are able to apply the wages of employees from a new plant directly to consumer expenditures using the PCE selection, simulating the IMPLAN Type III induced effect calculation. Because the plant pays wages that are higher than the regional average, these workers havė higher than average per capita consumption expenditures. Thus, the

[78]A recent IMPLAN News article briefly explained the procedures used for their estimation of the personal consumption expenditure (PCE) patterns. It notes that "PCE estimates are created using the Consumer Expenditure Survey (CES) data for expenditures by income group". Further , "the PCE for each year is controlled to the PCE estimates published in the Survey of Current Business" (Lindall, May 1996, p. 5). Other adjustments noted include reducing the number of income categories to IMPLAN's three selections and adjusting the data to state and county demographics.

example has a higher induced effect result that the Type III calculation[79] (p. 82). This is just one example of how PCEs can be used. For example, PCEs can be used to estimate the regional stimulus from consumption spending from proprietor income that might not be captured by the model otherwise. Proprietor income is an important component in tobacco production, thus this avenue will be explored further in the analysis section of this study.

Not to be confused with the broad PCE categories above, the IMPLAN dataset contains a separate database of activities referred to as the *PCE Activity Database* (MIG, Inc., p. 63). This database contains 122 different activities representing different specific consumer spending patterns such as tobacco products, gasoline and oil, spectator sports, etc.[80]. These activities can be retrieved from the database and used in a scenario. To provide an example, the tobacco products activity could be retrieved. It contains three events allocating consumer expenditures between the sectors for cigarettes, cigars and chewing and smoking materials. These activities can be useful in building scenarios when particular consumer spending allocations are not surveyed.

The basic constructs of a scenario are now described, but it is apparent that the actual structure of a scenario is limited only by the creativity of the analyst. However, some general suggestions do emerge. One issue for some studies is whether to put the entire change in final demand to a single sector (such as a change in tobacco demand) or to create a vector of final demand that spreads the resulting change in expenditures across

[79]Another analyst makes a distinction for scenarios that analyze the effect of a change in wages and salaries. When an activity is set-up to reflect the consumption effect from the change in income, it is different from a Type III induced effect. "A salary-based activity analysis in not simply a Type III induced multiplier effect. A specified salary level is a direct initiating effect that elicits a response from other industries in the local economy" (Economic Impact Assessment, IMPLAN Analysis Guide, p. 4-27).
[80]"The Bureau of Economic Analysis creates these expenditure patterns for their work on the national benchmark I-O tables in order to bridge the NIPA (National Income and Product Account) PCE (Personal Consumption Expenditure) data into their I-O commodity sectoring scheme" (MIG, Inc., p. 63). These expenditure patterns are based on national averages.

many sectors. The latter is called the *expenditure pattern method* and often incorporates the use of institutional PCEs and PCE activities discussed above. A simplified explanation of this method is that the expenditure pattern method creates an activity where the first-round direct effects are the change in final demand[81]. It is necessary in such an approach to add back the initial effect for the single sector to obtain the total effects[82].

One reason for using the expenditure pattern method is when the analyst knows that the linear relationship between the change in final demand and the **A** matrix is not structured that way for the situation being modeled. This method allows it to be structured differently for the first round. The application of the expenditure pattern method is what Powell (1991) has in mind for his *impact component analysis* (p. 161).

> *The basis of the impact component approach involves considering the way economic entities operating in a system might react to particular circumstances. Specific adjustments can then be applied to the various 'components' of the system. The analyst can interpose 'superior knowledge' of the behavior of the entities in a manner similar to the use of 'superior data' in construction input-output tables* (Jensen, Mandeville and Karunaratne 1979, from Powell, p. 165).

Sometimes the expenditure pattern method is required when changes in output are known instead of changes in final demand. Broomhall and Johnson (1991) look at this another way when analyzing a government program. They note that "Total Revenue + Govt. Payments = Total Cost + Profit" (Broomhall and Johnson, p. 79). They spread the right hand side costs and profit as expenditures in their scenario rather than final demand.

---

[81]This may be similar to creating IMPLAN's industry activity that uses the absorption matrix figures described in an earlier paragraph.

[82]Adding back the entire amount of the initial effect will be the practice for this study. Practice in other studies does vary. One study for a Maine power plant added back the initial effects pertaining to intermediate inputs, but not for wages (Wagner, Deller and Alward). However, adding back the wages component of the initial effects is important to the final results for a study of the contribution of the Virginia-Maryland Regional College of Veterinary Medicine (Kshirsagar).

Advocates of the expenditure pattern method claim that it helps the analyst to better understand the event being modeled and better interpret the results of change across the entire regional economy (Wagner, Deller, and Alward, p. 79, 81 and 99).

> *The approach is designed to produce better estimates by 'disaggregating' the problem being analyzed. That enables some of the limitations of multiplier analysis to be reduced. The various identifiable components of the economic change are used to build up the estimated total effect rather than using a 'single' multiplier* (Powell, pp. 160-161).

Note, however, the improvement of such a disaggregation is limited to the first-round effects, but if structured carefully, the initial and first round may capture most of the change (p. 174).

V.7 Multipliers

Multipliers are the most frequently used and abused feature of input-output. This section will not attempt to introduce all of the different types of multipliers available. It will be more useful to provide a basic introduction to multipliers that is sufficient for becoming adept in their correct application and interpretation. Other sources can be consulted for the actual calculation of the various multipliers. This section will conclude with a brief explanation of the multipliers generated by IMPLAN: output, personal income, total income, value added and employment.

Recall the Leontief inverse matrix or matrix of multipliers, previously introduced: $(I-A)^{-1}$. The matrix of multipliers is the basis for the generation of all other multipliers. Some multipliers can be created directly from information found in this inverse matrix and the A matrix. Other multipliers can be created by combining the inverse matrix with additional information. The rule or assumption made in generating these other multipliers is that the additional information selected as a basis for a new multiplier must be linearly related to output.

Multipliers are coefficients that capture direct, indirect, and, sometimes, induced effects. Normally the induced effect is captured by closing the model with respect to households. Type I multipliers are those that capture only the direct and indirect effects. Type II and Type III multipliers capture the direct, indirect and induced effects. For the purposes of this study, Type III multiplier will incorporate an induced effect calculated with the previously introduced alternative IMPLAN technique, while Type II multipliers have the standard closed model induced effect. Going back to the fact that multipliers are a ratio, the Type I multiplier is the sum of the direct and indirect effects divided by the direct effect. The Type II and III multipliers are sum of the direct, indirect, and induced effects divided by the direct effect.

IMPLAN generates six different multiplier reports using base information for the region chosen[83]. The first of these reports is the Leontief inverse matrix of multipliers. The remaining five reports provide the same columns of information for each row of sectors: direct, indirect, induced and total effects (sum of the direct, indirect and induced effects), plus Type I and Type III multipliers. The first four of these reports measure output, personal income, total income and value added. For these reports the direct, indirect, induced and total effects reflect the change in millions of dollars of these measures for a one million dollar change in final demand. The last report, employment, reflects the direct, indirect, induced and total effects in number of jobs for a one million dollar change in final demand. For all five reports the Type I and Type III multipliers are calculated for each sector using the appropriate columns of 'effects' as described in the previous paragraph. In the case of all five measures, the Type I and III multipliers have multiplicands in units of the measure.

Once a multiplier is created the most important obligation of the user is to understand

[83]IMPLAN also generates reports specific to scenarios that provide the direct, indirect, induced and total effects for the measures discussed here resulting from the scenario activities.

what it represents and how it should be applied. Recalling that all multipliers are a ratio with a numerator and a denominator, if a multiplier is to be applied properly, the multiplicand must be measured in the same units as the denominator. Too often, an incorrect multiplicand is applied to multipliers. Part of the problem is that not all IMPLAN documentation is consistent in this regard. An example with one of the measures will clarify the situation. A one million dollar change in final demand multiplicand yields a value added direct, indirect, induced and total effect factor in millions of dollars. Final demand is not the multiplicand for the Type I and III multipliers. Instead, the multiplicand is the direct change in value added from the economic activity being measured. The end result is that both Type I and III multipliers provide the total value added generated for one dollar of this direct change in value added activity. It is also erroneous to use output as the multiplicand for the Type I and Type III value added multiplier, but the mistake is sometimes made. The Micro IMPLAN Users guide has an appendix that describes multipliers. Unfortunately this general description is inconsistent with the IMPLAN calculations, because an output multiplicand is suggested for the Type I and III value added multipliers (Taylor et al., p. E-3). Fortunately, the MIG Technical Analysis Guide provides an example showing the calculation of income and employment multipliers that confirms the appropriate multiplicands provided above (pp. 48-49).

In summary, the appropriate multiplicands for the Type I and III multipliers are:

- output multiplier - "direct dollar change in output",
- personal income multiplier - "direct dollar change in employee compensation",
- total income multiplier - "direct dollar change in employment, proprietor and other property type income",
- value added multiplier - "direct dollar change in value added", and
- employment multiplier - "direct job change" (Lindall and Olson, undated, pp. 22-24).

How should the different effects and multipliers provided by the IMPLAN reports be used? What do multipliers reveal? Multipliers are useful for comparison across sectors to gauge how relatively interconnected the sectors are with the rest of the regional economy for the measure being evaluated. For any multiplier measure, a higher multiplier for a sector means there will be more growth in other sectors of the economy for a direct change in the measure (for that sector) than a similar change in a sector with a lower multiplier.

However, it is not advisable to strictly select those sectors with the highest multipliers to find those sectors that will have the largest economy-wide impact. First, and most obviously, not all sectors are equal in their ability to generate growth. Second, it may be preferable to look at sectors with the largest total effects. Total effects are determined by a change in final demand, the normal input-output measure of change. Total effects also better represent the entire change in the economy for a change in final demand. On the other hand, recall that multipliers are ratios. While a larger multiplier means there are larger indirect and induced effects relative to the direct effect, it may be misleading to cast aside those with small multiples, because they may have a larger direct effect for a change in final demand. Hence, the use of total effects to rank each sector's overall contribution to the economy for a change in final demand is preferred.

While all of the IMPLAN multiplier measures may be used at some point in this study, two will likely receive more frequent use. Value added is considered by informed analysts to be one of the better measures for gauging a change or impact in an economy. Its name is somewhat descriptive, because it refers to all of the efforts that go into creating a final product or service separate from the purchased intermediate inputs. These intermediate inputs are included in output measures. This situation creates double counting in the output measure, one reason for preferring the value added measure. The other measure that will be used is the employment measure. Employment is likely to be

one of the most inaccurate and difficult to interpret measures. This is partly due to the fact that employment is measured in total jobs in the current IMPLAN version, as opposed to full time equivalents (Lindall and Olson, 1993, p. 2). However, loss of employment opportunities is one fear associated with a decline in tobacco, so a measure is needed. Employment is perhaps the most meaningful measure to the lay person, thus its frequency in application.

V.8 Agricultural Applications - Literature Review

This section reviews the literature for applications of input-output found relevant to this study. Since an agricultural commodity is the subject of this study, literature reviewed is limited to this realm. Where possible, the techniques or findings from the literature are applied to the focus of this study. The section begins with a review of two articles that seek to measure the contribution of segments of an economy, with the latter article examining the tobacco sector. The next six articles reviewed look at different policy changes, most of them being impact analysis studies. The last article looks at both the contribution of tobacco to a region and the impact of various policy changes.

The Johnson and Wade (1994) study uses IMPLAN to measure the contribution of agriculture to the economy of the Commonwealth of Virginia. This study not only analyzes economic contribution resulting from producers of agricultural commodities, but also from associated agricultural input suppliers, distributors and agricultural related processors (Johnson and Wade, pp. 2-3). The results are stated in a form typically provided by IMPLAN impact studies: sales, value-added and employment measures.

The Johnson and Wade study has several findings specific to tobacco.

> *Tobacco sales in 1991 were estimated to be $197 million, which stimulated economic activity in the state by as much as $400 million. Farm-input purchases to produce tobacco contributed $137 million to GSP, and created 3,004 indirect jobs* (Johnson and Wade, p. 8).

The very significant contribution of cigarette production to the state is noted and quantified. Also quantified is the contribution from stemming and redrying operations, with estimated total sales in 1991 of $130 million and direct contribution to GSP of $18.3 million (p. 9). Stemming and redrying is reported to employ approximately 339 people in the same period (p. 9). The location and relative significance of these activities within the Commonwealth's agricultural districts is also reviewed. However, beyond these broad summary totals, no details are provided. For example, while the impact of tobacco on farm-input purchases is identified, no detailed break-down of the sectors providing these inputs is given, information readily available from IMPLAN and of significance to a study on tobacco's impact.

This USDA Economic Research Service report, "What Tobacco Farming Means to Local Economies", by Fred Gale (1994), uses IMPLAN to evaluate the contribution in 24 different tobacco growing regions. The brief abstract to the report notes that "tobacco farms are a small part of the tobacco industry" and "play a modest role in most local economies". The basis for this opinion is the small farm product share in final sales of tobacco products and tobacco's relatively small contribution as a percentage of local income and employment (Gale, p. i). However, these findings may not be generalized to the Southside *study region*. While it may be true that "much of the economic activity associated with the manufacture and distribution of tobacco products occurs outside the regions where tobacco is grown", this is not as true for Southside Virginia, due to the presence of stemming and redrying manufacturing[84] (p. iii). Some of the results are also dependent on the regional definition used.

[84]Care must be taken when evaluating 'economic activity' to identify the terms of measurement. Gale acknowledges in another section of his report that examination of total direct employment figures for tobacco shows that approximately forty percent are tobacco growers (p. 4).

It is difficult to reconstruct exactly how the author generated his figures using IMPLAN, given the relatively sparse explanation found in the report. A brief telephone conversation with the author on July 6, 1995, filled in a few areas, but still leaves some of the approach and rational to speculation. However, the author did elect to use impact analysis, running two scenarios. These scenarios are used to estimate the direct, indirect and induced effects for both income and employment from regional tobacco production that is either redried within or outside the region. These resulting effects are used to produce his own income and employment multipliers that are a 'joint' multiplier for tobacco production and stemming and redrying[85].

There is possibly a conceptual error in the setup of the two scenarios for some of the regions. The author states:

> *I assumed that final demand for tobacco produced in a region was the value of the region's stemming and redrying output plus the tobacco leaf exported to other regions for stemming and redrying* (Gale, p. 10).

The author created two IMPLAN scenarios he calls Impact A and Impact B. The Impact A scenario is for the stemming and redrying sector. Its final demand is regional stemming and redrying output which the author states came from an IMPLAN report. The Impact B scenario is for the tobacco production sector. The final demand for this scenario is the balance of the difference in regional tobacco production (sales) and the regional use of tobacco production as an intermediate input, found in the Impact A scenario. The latter figure represents regional tobacco production stemmed and redried outside the region (p. 10).

---

[85]It is possible to generate multipliers by sector with IMPLAN without having to run any impact analysis. These multipliers use the base figures for the region present in the IMPLAN data. This raises two issues. First, the author must believe that a joint multiplier for tobacco production and stemming and redrying is preferable to two separate multipliers. Second, it is possible to generate a joint multiplier even without running an impact analysis. The author must have reason to believe that his method of obtaining direct, indirect and induced effects is preferable to pulling this information directly from IMPLAN reports using IMPLAN data. Doing so would have prevented the possible errors noted in the next paragraph.

If the author uses output for final demand, he most likely incurs the first error listed by Henry and Johnson (1993) that results in common abuses of input-output multipliers. This error results from "using estimates of gross outputs of a new activity as the change in final demand" (Henry and Johnson, p. 36). Another statement of this error is provided in step one of Hastings and Bruker's input-output checklist, which is to verify that final demand is not production for other processing sectors (p. 24). Coincidentally, one of the Henry and Johnson illustrations of this very point utilizes the tobacco industry, stating that final demand will reside with the cigarette manufacturer, whereas tobacco production and stemming and redrying are intermediate inputs to this final demand (p. 32). However, not all regions contain the sector that generates the final demand, cigarette manufacturers in this case. In those regions without a cigarette manufacturer that uses all of the product, the final demand for the stemming and redrying sector would include shipments of the product to manufacturers outside the region. In this spirit, IMPLAN finds final demand for any region as a combination of foreign exports and residual domestic exports[86]. Thus, in this study, for those regions without any domestic use of the stemming and redrying product, the residual domestic exports will be the difference between the output and foreign exports.

Gale possibly makes the 'output in place of final demand' error only for those regions that also have cigarette or other tobacco processors that use stemming and redrying product as an input. Unfortunately, several of the author's regions contain cigarette manufacturers. In these cases, stating the final demand of the stemming and redrying sector as their total output will result in an overestimate of the total scenario impacts estimating regional contribution.

[86]Table 5.2 provides figures that illustrate the calculation of the residual domestic exports.

Another possible source of error in estimating regional contribution is the use of outside or non-IMPLAN numbers for tobacco production and IMPLAN numbers for stemming and redrying output. By not using numbers generated consistently, such as both IMPLAN numbers, there may be a mis-allocation of the proportion of final demand to each of the two sectors.

Given that the author looked at the contribution of tobacco production for 24 regions, it is unlikely he made regional-specific improvements to the IMPLAN base model data. Supporting this contention are the procedures described in the report and discussion with the author. In particular, the IMPLAN RPCs and other IMPLAN trade flow figures, the production function for the tobacco sector and other data appear to be used without modification. Another conclusion is that his study is most likely a straight-forward use of the IMPLAN system with fairly simple scenarios. Thus, potential areas for improvement exist in both areas. An evaluation of the multipliers developed by the author will not be made, because of difficulty in confirming the source of information. This study will take care in developing any multipliers, making sure that documentation of the multipliers will not leave any interpretation of their appropriate use in doubt. Finally, determination of the final demand for any analysis can be complex. However, there are alternative methods for establishing scenarios that may be appropriate. These alternatives will be evaluated by this study.

A paper presented at the Southern Regional Science Association 1995 Annual Meeting, "Regional Economic Impacts of the Loss of the Wool Act in Dependent Regions of Texas", uses IMPLAN to analyze the economic impacts of incentive payments for wool and mohair (Jones and Wyse). This paper does not provide any detail on how the IMPLAN model is setup, but it does illustrate the use of IMPLAN to estimate the impact of termination of a government program. In this case the National Wool Act is the terminated program (Jones and Wyse, p. 1). The operating assumption for this model is

that discontinued government incentive payments will be treated as a loss in sales (p. 3). Presumably the loss of sales is treated as a negative change in final demand for the impact analysis. The study acknowledges that longer run impacts are not considered in making any estimates, thus any potential offsets are not explicitly considered in the analysis (p. 4). However, the potential for price offsets in the case of mohair are alluded to, as are other offsets (p. 8). In general, the final results provided are the typical impact results in sales, income and jobs. Because the tobacco program does not operate under a similarly structured government subsidy, it is not completely analogous to this study.

One policy area that has received a great deal of attention and numerous application of IMPLAN impact studies is the Conservation Reserve Program (CRP). A 1990 survey, "Agricultural Policy Applications Using IMPLAN", cites three different CRP studies (Siverts, Alward and Maki, p. 26). These authors note the difference in emphasis made by each of the studies in regard to alternative uses of the land withdrawn from agricultural production under the program[87]. They note that all of the studies evaluate the economic impact of replacement rental payments, but that these alternative uses of the land are "critical to the analysis" of the total impact of the program (p. 26). One of the studies cited analyzes the impact on the local community from the loss of input sales when wheat is no longer produced due to the CRP program (Martin, Radtke, Eleveld and Nofziger). Part of this analysis required the incorporation of wheat budgets into the IMPLAN model to evaluate the changing expenditure patterns (p. 228). The same study also analyzes the impact of changes in producer personal income expenditures due to different income returns under the CRP program. This study provides an example for a tobacco study that chooses to analyze the influence of changing production levels on both purchased inputs and personal income expenditures to evaluate a wider resulting impact on the region.

[87]Farmers electing to participate in the CRP program receive rental payments in compensation for agreeing not to use the land for crop production.

Another CRP study aims to add an evaluation of "the impacts of post-retirement land use on the local economy" (Broomhall and Johnson, p. 76). In this case the alternative land use resulting from the CRP program is the establishment of tree farms for future timber harvests (p. 80). One interesting aspect of the study is the evaluation of the regional output and employment impacts of this alternative in 5 stages over 40 years (p. 81). Part of this includes an evaluation of the change in farm profits in each stage on consumer expenditures, assuming a change in these profits directly changes the level of consumer expenditures (p 80). Parallel applications can be made for certain changes in the tobacco program that would change farm profits. The study acknowledges that it does not evaluate the impact of a CRP induced reduction in commodity supply on prices, an important intention of the program and potential offset to negative regional impacts if prices rise as expected (p. 83). Recall that the Jones and Wyse study did not evaluate an expected change in mohair prices on the results of their study. Incorporating price changes into impact models resulting from other activities usually involves heroic assumptions. Consideration of changes in tobacco prices for a tobacco program change in supply may be similarly difficult to implement.

A side issue that has parallels to absentee quota rentals in tobacco production is considered in both of the CRP articles reviewed here. Martin, Radtke, Eleveld and Nofziger analyzed a separate assumption where 20 percent of CRP rental payments go to absentee owners. Thus, all of their consumption expenditures are assumed to be made outside of the region (p. 230). Of the three counties evaluated, the only county with a positive CRP impact became negative with this added assumption. The other 2 counties have increases in their net negative impact larger than 20 percent (p. 231). The Broomhall and Johnson article implemented a similar evaluation. Two different scenarios are modeled: one with no leakages and the other with a ten percent leakage of CRP rental payments (p. 81). Like the other article, the basis for these estimates is not disclosed. The differential from the absentee owners is not as significant in the

Broomhall and Johnson article, perhaps because of the nature of the alternative use of the land that is simulated. Nevertheless, the findings of both articles in this regard suggest the necessity of considering absentee owners on the impact of any tobacco policy changes.

Siverts, Alward and Maki (1990) refer to one study as an example where a "localized production function" is used, because the "national average production function is inappropriate from either a physical input or timing standpoint" (p. 23). The 1984 Alward and Sullivan study that they cite incorporated "ranch enterprise budgets" to localize the production function. This allows a better examination of "local rancher responses to grazing fee changes" (Siverts, Alward and Maki, p. 24). Siverts, Alward and Maki suggest that an alternative source of data for production function changes, besides crop budgets, is surveys (p. 24). Localizing the tobacco production function will increase the accuracy of this study, and crop budgets will be the source data for these changes.

A 1994 article in the *Journal of Agricultural Economics* is the only journal article found that addresses input-output and agricultural quotas jointly (Roberts). In this case the impact of changes in the milk quota on the United Kingdom economy is specifically addressed. Two main points are made in the paper. The first is that the basic final demand driven form of the Leontief model must be changed for this policy environment. A modified Leontief model is suggested for this purpose. The second point describes the benefit of evaluating not only backward linkages, but also forward linkages in this quota situation. A suggested means for such an evaluation is presented.

The first point recognizes that the milk quota controls output, and that any change in the quota can not necessarily be treated equivalently with a change in final demand (Roberts, p. 91). Others have warned about the incorrect use of output figures in place of demand in impact studies (Henry and Johnson, p. 36 and 38). Recall that the issue also arose in

analysis of the Gale study. The solution suggested by the author, a modified Leontief model, changes output from an endogenous variable to an exogenous variable so that the effect of a change in quota on output can be evaluated appropriately (Roberts, pp. 91-93). After the modified model is presented, a simpler method for achieving the same result is described. The output multipliers present in the $(I-A)^{-1}$ inverse require a change in final demand multiplicand. If each column of multipliers is divided by its respective main diagonal element (from upper left to lower right), then a change in output multiplicand can be used. The simplified solution may be useful in the case of tobacco quotas if the change in quota can not be stated in a change in demand equivalent.

The second point makes use of a "lesser-known supply-driven version of the input-output model" to measure the forward linkages of a change in quota (Roberts, p. 93). Recall that the standard input-output model only measures backward linkages. The goal here is to quantify the impact on purchasers of milk from a change in quota, largely milk processors in this case. The author uses a similar framework to the modified Leontief model (p. 94). However, the critical assumption here is "fixed output proportions", which means that a change in output will be distributed equally across purchasing sectors (p. 93). This is a very strong assumption that perhaps is minimized in cases where the commodity is mostly purchased by a dominant sector. While the results of the forward linkage analysis is interesting, it is beyond the scope of this study. Forward linkages will be considered in an analysis of study limitations.

Aspects of a 1994 journal article are applicable to this study. "Migrant Farm Workers on Virginia's Eastern Shore: An Analysis of Economic Impacts" (Sills, Alwang and Driscoll), has perhaps two relevant points for this study. The first is the importance of considering all related changes that exist for a seemingly singular event. In this case five different, sometimes offsetting, components of change are considered for an event where migrant labor is eliminated (Sills, Alwang, and Driscoll, p. 215). For example, although

vegetable crop production would be reduced in the absence of migrant labor, other less labor-intensive crops would be produced in their place. It will be important to follow the example of this study in considering all of the components of change for any tobacco events being studied. The second point is the importance of constructing an appropriate final demand vector for labor. Surveys are conducted for the Sills, Alwang and Driscoll study to evaluate the expenditure patterns of migrant laborers. An important finding is that migrants save approximately 25 percent of their earnings (p. 221). These savings are not spent in the local economy, so the multiplier effect of their earnings is reduced. It is believed that the savings of foreign, or H2A workers, is even higher (p. 216). Migrant or H2A labor is relevant to tobacco production as well. While it will be important to estimate as accurately as possible the demand vector associated with this labor, it will not be a focus of this study.

The purpose of a 1989 Ph.D. dissertation at Clemson University (Sureshwaran) is to analyze the impact of the existing and potentially changing tobacco program on different sectors of the South Carolina economy. There are two aspects to the study. The first is the use of linear programming to develop different scenarios reflecting alternative potential uses of land that previously produced tobacco. The second part is to analyze the economic impact of these different scenarios using input-output techniques.

Beginning with this second part, the input-output techniques used by Sureshwaran are less sophisticated than those commonly used today. To build his input-output table the 1977 national input-output table is modified to reflect South Carolina using the simple location quotients approach (Sureshwaran, p. 74, 78). The final table is aggregated into 61 sectors (p. 75). It appears that this level of aggregation creates some problems. Furthermore, adjustments made by the author suggest that the source national input-output table is an industry-by-industry table that does not accommodate secondary products. As a remedy to prevent a change in tobacco demand from inappropriately

effecting related farm products sectors, the author zeroes out all other coefficients in the tobacco sector column (p. 79). This problem and others readily demonstrates improvements that can be made by using an input-output model such as IMPLAN that has data prepared with more sophisticated techniques and which has a framework that accommodates secondary products.

The resulting input-output table is used to evaluate the existing contribution of tobacco to South Carolina. In addition, a number of different scenarios are evaluated:

1. Elimination of the tobacco program, with a short-term and long-term alternative measurement;
2. a 50 percent reduction in the tobacco quota; and
3. a ten percent reduction in the support price.

These are evaluated within two linear programming alternatives that maximize profits. The first alternative does not allow an introduction of new crops, while the second allows the introduction of new crops and livestock options. The linear programming work provides "changes in gross revenue and farm income" that "are used as final demand changes in the input-output model" (p. 82). Several interesting findings are noted. One is the fact that some of these policy changes do not affect all tobacco producers equally. The author notes that all of the scenarios decrease net revenue for tobacco producers as a whole, but that scenarios one and three above increase net revenue for producers that owned mechanical harvesters (pp. 104-105). Another relevant finding is that, in general, the scenarios impact farm input supply sectors the most, the three largest being the real estate sector, then chemical products and then wholesale trade (p. 131). One aim of this study is to measure similar impacts across sectors of Southside Virginia.

Chapter VI

Empirical Model and Results

VI.1 Introduction

Chapter V presented a plethora of general issues that any analyst intending to use input-output must confront, as well as additional specific issues that arise with topics similar to this study. The next section provides a brief review of these issues and discusses how they will be addressed in this study.

VI.2 A Review of the Issues

As discussed in Chapter V, a number of adjustments are often made to the IMPLAN base-model data. A likely adjustment will be to the production function for the tobacco sector. Section VI.3 will address these production function changes. Other regional data may have to be adjusted as well. One consideration that will be acted on is the verification of the IMPLAN regional accounting data for the tobacco and tobacco stemming and redrying sectors. Section VI.4 will compare the IMPLAN total output for these two sectors with other sources, and make any necessary adjustments.

A problematic data limitation with regional models is trade flow information. Since both flue-cured tobacco production and tobacco stemming and redrying processing exists in Southside Virginia and North Carolina, cross-hauling of tobacco occurs between the *study region* and North Carolina. A survey of warehouses in the *study region* confirms that North Carolina stemming and redrying operations purchase tobacco in Southside Virginia. Furthermore, the same survey results and Consolidated Farm Service Agency data indicate that tobacco may cross the *study region* border in the marketing process. Accordingly, section VI.5 will review trade flow data and regional purchase coefficients and adjust them to the extent adjustments can be justified.

Scenario development is discussed in the previous chapter. When scenarios are constructed for this study, appropriate practices such as price deflation and the proper use of local purchase coefficients will be followed. Most importantly, the activities making up the scenario will try to best capture the economic event being followed. This will involve the use of the expenditure pattern method. Related to this is the use of personal consumption expenditures in the scenario design in order to simulate the IMPLAN Type III induced effect. The structure and intention of the study scenarios is described in section VI.6.1. The results of the impact analysis from the study scenarios are presented in section VI.6.2 .

The best of the approaches to tobacco and related commodity or policy issues, presented in the literature review, will be consolidated into this study to provide an improved regional study focusing on tobacco. Focus on a single, functional economic region with incorporation of better regional data should lead to better results than the Gale (1994) study that provides broad measures of the regional contribution of tobacco. This study intends to go deeper than broad measures. Similar to the Sureshwaran (1989) study, the impact of changes in tobacco on different sectors of the regional economy will be evaluated, although with a more powerful input-output tool and different region of

analysis. Section VI.6.3 provides the sectoral impacts of the different scenarios being considered.

Interplay between the tobacco and stemming and redrying sectors, in the form of trade flows, will be examined, and their implication on scenario construction will be considered. The Gale study did not construct scenarios comprehensively for those regions with internal cigarette production, but his basic approach will be suitable for the Southside *study region*, because no cigarette manufacturers are present.

Roberts (1994) raises the issue of quotas in conjunction with input-output analysis and suggests that, for the case of the milk quota in the United Kingdom, a quota change in output should not be evaluated as a change in final demand. A simplified explanation of her solution to this dilemma is to conduct an evaluation with input-output multipliers that accepts output as a multiplicand. Section VI.6.1 will discuss whether this situation is present in the case of tobacco quota and whether her solution, or another one, is necessary.

The CRP program has a number of different input-output applications, including accommodation for the loss of rental payments to absentee land-owners. This study quantifies absentee tobacco owners using government records. The resulting impact from absentee quota owners on different policy scenarios using the absentee quota information is discussed in section VI.6.2.

Absentee quota owners are not the only loss of income from tobacco production in the *study region*. Some wage income earned by migrant or foreign H2A workers is saved by the workers, reducing expenditures in the region. This is one finding for migrant labor that harvests vegetable crops in the Eastern Shore of Virginia (Sills, Alwang and Driscoll). This study will not focus on this loss, but applicable scenarios will use the

same savings estimates from the Eastern Shore study when determining the remaining wage income expenditures in the *study region*.

VI.3 Production Function Changes

Previous sections have indicated that a change in the IMPLAN production function for industry 15, tobacco, may be warranted. No such change is planned for industry 107, tobacco stemming and redrying. In order to determine whether a production function change is needed for the tobacco industry, a more localized production function will be prepared using Virginia and national flue-cured tobacco crop budgets. This localized flue-cured production function will be compared to the IMPLAN tobacco production function. If differences between the two production functions are significant, then the localized production function values will be incorporated into the models.

Table 4.17 previously introduced the 1995 Virginia Central District Farm Management flue-cured tobacco budget. Recall that this budget is for a medium-sized farm of approximately 50 acres, that yields 2,500 pounds of tobacco per acre on average. Budgeted cash receipts of $4,325 per acre are based upon an average price of $1.73 per pound. Unfortunately, the Central District Farm Management budget does not provide a more detailed breakdown of the 'returns to land, quota, overhead and management' budget line. A 1995 national budget prepared by the USDA using 1991 survey data and current costs is used to estimate this breakdown, and to determine the reasonableness of the Virginia budget. Cash receipts in the USDA budget of $3,479 per acre reflect a lower yield of 1,933 pounds per acre, and a higher average price of $1.80 per pound, because it uses figures actually realized in 1995 (Glaze, pp. 33-34).

Appendix 4.1 provides a comparison of the USDA and Central District Farm Management budgets. Total variable costs as a percentage of cash receipts are approximately 54 and 51 percent for the USDA and Central District Farm Management

budgets, respectively. The individual variable cost budget line items can vary by more than three percent, but, in general, the comparisons are reasonable. Several Central District Farm Management budget lines are allocated to more than one line item using supporting schedules provided by the Central District Farm Management[88]. The actual number used for 'labor' and 'noncash benefits' for the Central District Farm Management budget in Appendix 4.1 is slightly higher than the original budget[89]. The original budget used only H2A laborers in its estimate. The revisions made, as reflected by Appendix 4.1.1, use a hired-labor allocation of 30 percent domestic, 20 percent seasonal (migrant), and 50 percent H2A[90]. These revised hired labor expenditures are prepared using labor cost schedules supplied by Central District Farm Management.

Given the fixed nature of most of the non-variable cost budget line items, it is more reasonable to compare the amounts, rather than compare the percentages that are based on different total cash receipts. 'Capital replacement', the first of these budget line items, shows a large difference in the USDA and Central District Farm Management amounts. The latter budget has fixed costs allocated for tractors, trucks, farm implements, bulk barns and irrigation equipment in their capital replacement budget line item. These fixed costs reflect an annual allocation for equipment replacement. Although the Central District Farm Management number is higher, the supporting detail provides confidence for its use.

An estimate of $200 is made for the 'general farm overhead' budget line item that is

[88]For example, 'hired labor' in the Central District Farm Management budget is allocated to 'labor', and to 'noncash benefits', for the comparison to the USDA budget. Additionally, 'tractor, equipment, fuel and repairs' is allocated to 'fuel and lubrications', and to 'repairs'. Finally, 'marketing charges' is allocated to 'warehouse fee', 'assessments', and 'inspection and grading fee'. Some of the other budget lines are summed to fit the USDA categories.

[89]The revision results in $19.69 more in hired labor costs. This is slightly more than a two percent increase. A more important result of the allocation is the difference in the distribution of the noncash benefits. This difference will be important to the final allocation.

[90]These percentages are based upon estimates made by three county extension agents.

inserted into the Central District Farm Management budget. This is lower than the respective $225 in the USDA budget. However, another $44.50 will be allocated to general farm overhead from the 'other' and 'noncash benefits' line items when the final Virginia budget is prepared[91]. Like the higher Virginia 'capital replacement' number, a higher Virginia 'general farm overhead' number reduces the final allocation to 'management returns'.

Another large reduction before the calculation of 'management returns' is the budget line item for 'land and quota charge'. The USDA budget uses a rate of 41.4 cents per pound of tobacco for this item (Glaze, p. 34). The estimate inserted into the Central District Farm Management budget uses a rate of 35.0 cents per pound[92]. The lower yield per acre used in the USDA budget results in the lower total for this line item, even though a higher quota rental rate is used. Note that the land and quota charge is the largest budget line item for both budgets.

'Management returns' completes the budget. For both budgets the return is less than three percent. This tends to confirm the earlier theoretical construct that the quota rental rate captures most of the 'profit' in the enterprise of producing tobacco. Fortunately, most tobacco producers are likely to own some quota. Despite the low rate of return to management, producers may be encouraged to rent additional quota in order to cover fixed costs for machinery and equipment.

The next step is to prepare a production function from the revised Central District Farm Management budget. Appendix 4.2 provides the bridging table used to allocate the budget line items to the different IMPLAN sectors. In some cases there is a one-for-one

[91]The original Central District Farm Management budget has $32.50 allocated for 'building insurance and electric'. The remaining $12.00 is part of 'noncash benefits' allocated for 'supplies' (see Appendix 4.1.1).
[92]This rate is based upon estimates provided by three county extension agents. Note also that the 1991 quota rental rate for the Piedmont region was 29.4 cents per pound according to a USDA survey (Clauson and Grise, p. 10).

correspondence between the budget line item and the IMPLAN sector. In other cases a weighted average is calculated using the existing IMPLAN allocation for related IMPLAN sectors[93]. This is particularly important for the allocations made for 'repairs' and 'overhead'. The 'overhead' budget line item picked up most of the remaining sectors in the original IMPLAN allocation, except for those that are excluded from any allocation.

Another important point to note in the bridging table is the budget line items that are not allocated to IMPLAN sectors. These budget line items are allocated to value added categories instead. All of the labor and some of the labor benefits are allocated to the value added category 'employee compensation'. Quota rental is allocated to 'other property income'. Management returns and the large machinery and equipment fixed costs are allocated to 'proprietary income'. The fixed costs associated with equipment are not considered an intermediate input in input-output analysis, and are not allocated to a sector. This issue will be important in a later section when scenarios are designed.

Appendix 4.3 compares the final production function allocation and the original IMPLAN allocation. The final allocation is spread across 75 sectors and 3 value added categories. The last column indicates the difference between the two allocations. Eight sectors decreased by more than one percent of the total allocation, with three of these being for more than five percent. Similarly, eight sectors increased by more than one percent, but only two of these are for over five percent. Table 6.1 provides the three largest changes in each direction.

[93]The IMPLAN allocation for each sector is taken from IMPLAN report #114, the Industry Balance Sheet, run for the tobacco industry (sector 15).

Table 6.1 Sectors with the Highest Change in the Production Function Allocation

Sector	Item	Change
462	Real Estate	-0.09102
26	Agricultural, Forestry and Fishery Services	-0.07880
Value Added	Other Property Income	-0.05945
Total		-0.22927

Sector	Item	Change
Value Added	Employee Compensation	0.08760
Value Added	Proprietary Income	0.08096
515	Other Federal Government Enterprises	0.04434
Total		0.21290

Reasonable explanations can be made for most of the changes seen in Table 6.1. The sum of the three value added categories indicates that, in total, value added has increased almost 11 percent. This may be partly due to the high level of farm machinery equipment fixed costs allocated to 'proprietary income'. 'Employee compensation' may reflect some hired labor that was previously allocated to the 'agricultural, forestry and fisheries services' sector. It is difficult to determine what the original 'real estate' allocation pertained to. Perhaps the IMPLAN allocation included some land and quota rental charges in the real estate allocation. Quota rental charges, which include land rental, are in the final allocation of the 'other property income' value added category. However, this category decreased as well. Quota rental rates have been fairly stable since 1992, so this does not account for the change.

Overall, it appears that the final allocation is a better estimate of the production function for flue-cured tobacco. Sectors that were anticipated to increase did show an increase. For example, the higher fuel costs of curing flue-cured tobacco is reflected in an increase of approximately 4.6 percent of the total budget to the 'petroleum refining' and 'gas production and distribution' sectors. Agricultural chemicals and fertilizer sectors also showed an approximately 5.8 percent increase in total budget allocation. Thus, for

further applications the final production function allocation (Appendix 4.3) will be used rather than the IMPLAN allocation.

VI.4 Regional Total Output for Tobacco and Tobacco Stemming and Redrying

This section will examine some of the underlying regional data present in the IMPLAN model for 1992. It will also collect and analyze the 1995 data needed for the scenarios that will be constructed. A starting point is 1992 output for the tobacco industry (Table 6.2).

Table 6.2 1992 Tobacco Industry Output for the Southside *Study Region*

Region	Census ($)	Virginia Agricultural Statistics * ($)	IMPLAN Total Industry Output ($)
Brunswick	9,227,000	9,726,806	9,751,662
Charlotte	7,647,000	6,827,283	8,200,233
Halifax	25,820,000	29,919,407	28,450,060
Lunenburg	8,444,000	8,818,500	8,436,050
Mecklenburg	18,942,000	19,979,194	19,053,020
Pittsylvania	39,247,000	38,575,646	39,286,000
Danville			489,536
South Boston			408,980
Total	109,327,000	113,846,836	114,076,000
Tobacco Commodity Production**			111,024,800

Source: 1992 *Virginia Agricultural Census*, Table 12 and 1992 *Virginia Agricultural Statistics*, pp. 41 and 44. IMPLAN total industry output for this sector agrees with Table 5.1, and IMPLAN commodity production agrees with Table 5.2.

Note: The Census and IMPLAN numbers include tobacco types other than flue-cured.

* Calculated using the flue-cured production figures, in pounds, by county, and the average producer's sale price of $176.37 per 100 pounds. Recall from Chapter III that flue-cured tobacco is over 98 percent of the regional production.

** For the tobacco industry, the by-product coefficient for the tobacco commodity is .97325. Two other commodities make up the remaining balance of industry production.

The IMPLAN total ($111 million in output), after removing commodities other than tobacco, falls between the Census and Virginia Agricultural Statistics totals. The difference between the 1992 Census total and the IMPLAN Commodity total is approximately 1.6 percent of the Census total. This result appears to be within a reasonable range of accuracy.

It is not possible to perform a similar test of reasonableness for the IMPLAN 1992 tobacco stemming and redrying total industry output using published data. Table 5.1 previously supplied the IMPLAN *study region* total output of approximately $725 million for this industry. Disclosure requirements prevent the Census of Manufactures from providing collaborating detail on this industry at the state level or lower. However, the IMPLAN *study region* output is approximately 20 percent of the national total. This appears reasonable, given the number of stemming and redrying operations outside the region[94].

Given these results, there is no justification for changing the IMPLAN output totals for either sector. This study will assume other regional accounting data for these sectors are also reasonable, given that a proper base is established with output. However, this study desires to use more recent production figures. Returning to the tobacco industry, Table 6.3 provides a comparison of 1992 and 1995 output in pounds. The last column of Table 6.3 contains 1995 tobacco industry output in dollars. Output in dollars is calculated similar to the 1992 figures provided in the Virginia Agricultural Statistics column of Table 6.2.

[94]The study region has two of the twelve flue-cured stemming and redrying facilities. There are a few other burley-only processing facilities outside the *study region* as well.

Table 6.3 1992 and 1995 Southside *Study Region* Tobacco Industry Output

Region	1992 Pounds	1995 Pounds	1995 Dollars
Brunswick	5,515,000	5,449,000	9,846,343
Charlotte	3,871,000	2,886,000	5,215,002
Halifax	16,964,000	11,650,000	21,051,550
Lunenburg	5,000,000	4,327,000	7,818,889
Mecklenburg	11,328,000	10,173,000	18,382,611
Pittsylvania	21,872,000	16,336,000	29,519,152
Total	64,550,000	50,821,000	91,833,547

Source: 1992 *Virginia Agricultural Statistics*, p. 41, and unpublished 1995 data supplied by the Virginia Agricultural Statistics Service.

Note: An average price of $180.7 per 100 pounds is used to calculate the 1995 column in dollars.

Flue-cured output, in pounds, for the Southside *study region* is lower for 1995 than 1992. Despite higher prices, 1995 levels are also lower in dollars. Lower production in 1995 when compared with previous years will have to be taken into consideration when it is used to measure the contribution of flue-cured tobacco to the *study region*[95].

It is likely that lower 1995 domestic production of tobacco also led to lower tobacco stemming and redrying production. The Southside *study region* tobacco stemming and redrying output for 1995 must be estimated. Recall that the Southside stemming and redrying operators are surveyed. Table 4.24 indicates that their combined production in 1995 used 199,099,000 pounds of tobacco. The estimate of 1995 regional output for this industry involves a projection from the production use of this input level.

The starting point for this estimate is to convert the tobacco input pounds to their dollar value. Using an average price of $1.81 per pound, $360.369 million of tobacco is

[95]Flue-cured production for the *study region* in 1993 is 56,197,000 pounds and for 1994 it is 64,643,000 pounds. Thus, 1995 has lower output than the previous three years. This lower level is due to lower yield. Lower quota levels were not a cause for lower production. Recall that the 1995 quota level is actually higher than the previous three years.

processed[96]. The tobacco inputs in dollars can be converted into total industry output in dollars by using the 1992 IMPLAN production function for the industry[97]. The absorption coefficient for tobacco is 56.726 percent of the inputs (including income) in the tobacco stemming and redrying process (Table 4.22)[98]. Thus, 1995 output is estimated to be $635.280 million (Table 6.4). When compared to 1992 output (per IMPLAN) of $725.122 million, output has fallen over 12 percent[99]. This lower estimated 1995 output is an expected result, given that regional tobacco production is approximately 20 percent lower, and that national average yield follows suit. Accordingly, this estimate appears to be a reasonable basis for the measurement of tobacco's contribution to the regional economy. However, like the output figure for the tobacco sector, this lower level of production must be taken into account when making the final evaluation of 1995 contribution to the regional economy.

Table 6.4 Estimate of 1995 Tobacco Stemming and Redrying Output for the Southside *Study Region*

Production in Pounds	199,099,000
Average Price per Pound	$1.81
Tobacco Inputs	$360,369,000
Tobacco Absorption Coefficient	.56726
Total Stemming and Redrying Output	$635,280,000

[96]This average price is a weighted average of average 1995 prices of $1.794, $1.855, and $1.670 for flue-cured, burley and Maryland tobacco, respectively. Recall that the stemming and redrying survey indicated that approximately sixty percent of production is flue-cured and forty percent is other types.
[97]This assumes no substantial change in the production function has occurred since 1992. This is a reasonable assumption given that tobacco is the most significant input, and technology and prices have changed little.
[98]Price variability in the tobacco input will also change this absorption coefficient and thus limit the accuracy of this estimate.
[99]This disregards inflation.

VI.5 Trade Flow Data and Regional Purchase Coefficients

Since tobacco is the focus of this study, the regional purchase coefficient for tobacco becomes the most important of these coefficients to address. Estimates can be made of regional flue-cured tobacco purchases, made by affiliates of Southside stemming and redrying operations, using the data gathered in the warehouse survey. The stemming and redrying survey provides the pounds of flue-cured tobacco used by Southside operations. Table 6.5 shows these purchases, uses, and an estimated shortfall in the tobacco input required for their production.

Table 6.5 1995 Southside *Study Region* Flue-cured Tobacco Purchases and Use

	Survey Purchase Results (%)	Estimated Regional Purchases (Pounds)	Actual Use within the Region (Pounds)	Shortfall of Flue-cured Tobacco (Pounds)	Shortfall Percentage (%)
Southside Sales	100.00	91,856,609			
Processor 1	23.36	21,458,000	47,000,000	25,542,000	54.3
Buyer X / Processor 2	36.38	33,417,000	67,584,000	34,167,000	50.6
Total		54,875,000	114,584,000	59,709,000	

Source: The Virginia Agricultural Statistics Service provided the Southside sales figures. The remaining data come from study surveys. This table shows the estimated regional purchases of flue-cured tobacco for Southside stemming and redrying processors by their buyers compared with the actual use of flue-cured tobacco by these processors.

The estimates in Table 6.5 assume that Processor 1 buys all of the flue-cured tobacco it processes and that Buyer X buys all of Processor 2's needs. There could be some exceptions, particularly if either plant processes Brown and Williamson tobacco. However, most of the information gathered does not indicate that this exception, or any others, are present to the extent they can cause significant error in the estimates.

Table 6.5 only begins to address the question of how much Southside tobacco production is used by Southside stemming and redrying operators. A further complication to this estimate is the amount of cross-hauling involved with tobacco marketed in the region. Table 6.6 addresses this issue by assembling information from several sources. The table reconciles 1995 Southside production with 1995 Southside market sales.

Table 6.6 1995 Southside *Study Region* Flue-cured Tobacco Trade Flows

Item	Pounds	Percentage
1995 Southside Production	50,821,000	77.2
1995 Other Virginia Production	14,969,000	22.8
Total 1995 Virginia Production	65,790,000	100.0
Less: Virginia Production Sold in North Carolina	7,616,000	
Total 1995 Virginia Production Sold in Southside Markets	58,174,000	74.9
Plus: North Carolina Production Sold in Virginia	19,505,000	25.1
Total 1995 Production Sold in Southside Markets	77,679,000	100.0
Previous Year's Production Sold in Southside Markets *	14,177,000	
Total 1995 Sales in Southside Markets	91,856,000	

Source: 1995 Virginia production data and sales in Southside markets is from the Virginia Agricultural Statistics Service. The cross-border trade information is from the Consolidated Farm Service Agency (see also Table 3.9).

* This amount is calculated from the difference between 1995 production and sales. It represents approximately 15 percent of sales. This may not be unreasonable given that yields below quota in 1995 allowed production held from previous years to be sold using the under-utilized 1995 quota allotment.

Using information from Table 6.6, total 1995 Southside production sold in Southside markets is estimated at 44,910,328 pounds[100]. This total is 57.8 percent of total 1995 production sold in Southside markets. Assuming the previous year's production sold in Southside Markets is the same proportion, this same percentage is appropriate for the

[100]Calculated by multiplying total 1995 Virginia production sold in Southside markets, 58,174,000 pounds, by the 77.2 percent Southside production proportion.

Southside production share of total Southside sales. The 57.8 percent factor, or 'Southside production sales factor', is an important component in the estimation of the tobacco regional purchase coefficient. Table 6.7 provides the detail for the calculation of this estimate.

Table 6.7 Southside *Study Region* Tobacco Regional Purchase Coefficient Estimation

	Processor 1 (Thousands of Pounds)	Processor 2 (Thousands of Pounds)	Total (Thousands of Pounds)
Estimated Tobacco Purchases from Southside Markets (Table 6.5)	21,458	33,417	54,875
Estimated Internal Use of Tobacco Purchased from Southside Markets (Table 4.25)	* 18,095	26,000	44,095
Estimated Internal Use as a Percentage of Southside Purchases	84.3 %	77.8 %	80.4 %
Southside Production Sales Factor	.578	.578	
Estimated Internal Use of Tobacco Produced in the Southside	10,459	15,028	25,487
Total Tobacco Use (Table 4.24)	85,000	114,099	199,099
Internal Use of Southside Production as a Percentage of Total Tobacco Use	12.3 %	13.2 %	12.8 %
IMPLAN RPC	11.5 %	11.5 %	11.5 %
Regional Use Based On IMPLAN RPC	9,775	13,121	22,896

Note: 'Internal use' refers to those purchases processed by Southside stemming and redrying operators.

* Estimate based on Processor 2's purchase percentage for the Southside *study region*.

Table 5.2 shows the IMPLAN calculation of the 1992 supply/demand pooling coefficient for sector 15, tobacco. Recall that the supply/demand pooling coefficient serves as an upper bound for the regional purchase coefficient. In 1992, the tobacco sector reached this upper bound, so the supply/demand pooling coefficient is used as the regional purchase coefficient (.11532)[101]. The Table 6.7 caption 'internal use of Southside production as a percentage of total tobacco use' is calculated in a fashion similar to the supply/demand pooling coefficient. However, in this case, unlike other supply/demand pooling calculations, cross-hauling has been taken into account by the application of the 'Southside production sales factor'. This calculation leads to a result that is close to the IMPLAN regional purchase coefficient. The estimate is 12.8 percent to IMPLAN's regional purchase coefficient of 11.5 percent.

The previous estimate has left out one other consideration. Some tobacco produced in Southside Virginia, but sold in North Carolina, will likely end up being processing in Southside Virginia. This quantity is difficult to estimate with the information available. However, if all of this tobacco is processed in the *study region* the estimate increases from 12.8 percent to 16.6 percent, or a 3.8 percent increase. Using some of the previous assumptions, this amount is very likely to be even lower, 14.4 percent being a conservative upper estimate. This is still a fairly small difference with the IMPLAN 11.5 percent regional purchase coefficient. Given the assumptions used in making this estimate, and the relatively small difference found, there is no justification in altering the tobacco regiónal purchase coefficient. Note that if a significant change in this regional purchase coefficient is necessary, then the multipliers generated for this sector in Chapter IV would be incorrect.

[101]The IMPLAN trade flows for the tobacco sector has a high level of foreign exports in 1992 when compared to 1990 (Table 5.2). This makes the 1992 regional commodity supply lower relative to demand. This is probably the reason that the supply/demand pooling coefficient upper bound came into effect. Note that the 1990 supply/demand pooling coefficient is higher, resulting in the regional purchase coefficient being used (Table 5.2).

A final trade flow issue is the level of 1992 foreign exports for the tobacco sector (see Table 5.2). According to the IMPLAN model, foreign exports are approximately $63 million or about 57 percent of total industry output. In 1990, the same IMPLAN foreign exports are just a tenth of a percent of total output. However, given that the net regional commodity supply (demand) previously determined is reasonable, then a higher level of foreign exports simply reduces domestic exports. A change between foreign and domestic exports has no bearing on the actual IMPLAN impact calculations. No export totals will be used in this study. Thus, the accuracy of the foreign exports is not important[102].

VI.6 Scenarios

Once the required background data have been collected, and various data in the IMPLAN model have been verified or adjusted, the actual use of the IMPLAN model can begin. This section will have three parts. First, the basic model structure is explained. Second, the intention of each scenario and its summary results are presented. Finally, more detailed sectoral results are analyzed for selected scenarios.

VI.6.1 Basic Model Structure

Twelve different scenarios are designed to meet the study objectives. However, two basic model structures are used for all of these scenarios. Each model structure is made up of a group of one or more sectors that are called *activities*. What differs for each scenario is the gross change in final demand, or *activity level*, assigned to each activity (and sector) when each of the scenarios is run. These activity levels, when combined with the model structure, determine the net change in final demand that makes each scenario unique.

[102]According to MIG, Inc., the higher foreign exports in the 1992 IMPLAN database compared to the 1990 IMPLAN database relates to a change in the BEA benchmark tables. The 1992 database uses the 1987 BEA benchmark tables while the 1990 database uses the 1982 BEA benchmark tables. Exports were redefined in the 1987 BEA benchmark tables. The previous BEA benchmark table had all of the tobacco being sold to domestic processors.

Table 6.8 provides a listing of the 12 scenarios and their activity levels. Six different columns in the table provide the activities used in the two basic model structures. The second and third columns are the activities that make up the first of these model structures. Five scenarios use this structure. The second model structure is made up of the last four columns of activities. The remaining seven scenarios use this structure.

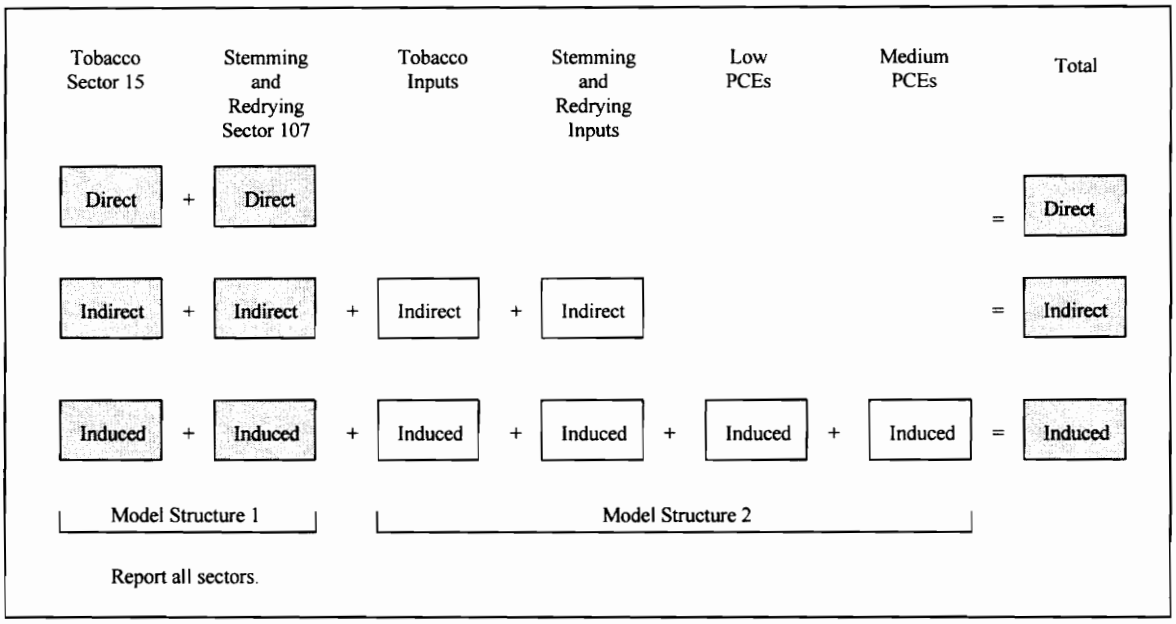
Table 6.8 Components of Gross Change in Final Demand (Activity Levels) Assigned to Each Scenario

	Model Structure 1		Model Structure 2			
Scenario Name	**Tobacco Sector 15 ($ Millions)**	**Stemming and Redrying Sector 107 ($ Millions)**	**Tobacco Inputs ($ Millions)**	**Stemming and Redrying Inputs ($ Millions)**	**Low Personal Consump. Expend. ($ Millions)**	**Medium Personal Consump. Expend. ($ Millions)**
FARMING	84.5430	0	0	0	0	0
GALE	46.2738	520.1653	0	0	0	0
EXPEND	0	0	84.5430	584.8431	16.2661	55.8769
EXPENDR	0	0	84.5430	584.8431	9.2025	37.0743
ABSENTEE	0	0	84.5430	584.8431	9.2025	35.7919
MRKTSHR	0	0	84.5430	643.3274	9.2025	38.2017
MRKTINI	42.4485	572.1819	0	0	0	0
QUOTA10	0	0	76.0887	526.3588	8.2823	32.2127
QUOTAINI	41.6464	468.1488	0	0	0	0
RPROFIT	0	0	84.5430	584.8431	9.2025	30.7368
NOQUOTA	0	0	126.8145	877.2647	13.8038	36.1463
NOQUOINI	69.4107	780.2480	0	0	0	0

Note: Columns two through seven represent activities containing one or more sectors. The numbers in this table represent the gross change in final demand assigned to each activity that is in turn assigned to one or more sectors. Not all of the gross final demand is allocated in every situation. The table indicates that there are two basic model structures. Figure 6.1and Figure 6.2 show two different combinations of these model structures used to find the total effects being measured for the net change in final demand.

Each of the two activities making up the first model structure assigns the gross change in final demand to one sector. Sector 15, tobacco, is the sector assigned to one of these activities, while sector 107, tobacco stemming and redrying, is assigned to the other activity. IMPLAN can control what proportion of the gross change in final demand is allocated to a sector using a specific *conversion rate* assigned to the sector. Both sectors

15 and 107 have a conversion rate of '1.0', meaning 100 percent of the gross change in final demand will be allocated to the sector. To use the GALE scenario as an example, $46 million of final demand is assigned to the tobacco sector and $520 million is assigned to the stemming and redrying sector. Figure 6.1 illustrates schematically how the first model structure, used by the GALE scenario, provides all of the total effects measured for the gross change in final demand.



Note: The gray shaded boxes indicate those boxes used in the calculation of the total effects. In this situation the grand totals from Model Structure 1 are used in the calculation of the total effects.

Figure 6.1 Schematic of the Total Effects Calculated Using the First Model Structure

The second model structure is more complex, not only because it has four activities, but because each activity has multiple sectors assigned to it. The first of these activities has 74 sectors that represent the different inputs in the tobacco production process. The tobacco production function developed earlier is used to make the different conversion rate assignments for each event (Appendix 4.3). The total conversion rate for the tobacco inputs activity is .5746, meaning 57 percent of the activity level, or gross change in final

demand, assigned to this activity is actually allocated to sectors[103]. There is also an activity for the inputs to the tobacco stemming and redrying production process. The IMPLAN production function (absorption coefficients) for this industry is used to assign the conversion rates to 60 different sectors contained in this activity. The total conversion rate for all of these sectors is only .0688.

Several changes are made to both of the input-oriented activities. One of these changes involves removing sectors 15 and 107, as indicated by the original production function, from the activity. For example, by removing the events for sectors 15 and 107 from the stemming and redrying inputs activity, the total conversion rate went down by .6779, leading to the low final rate noted above (see also Table 6.10). The reason for removing these two sectors will become more clear when the entire model structure is laid out.

Another change is made to the tobacco inputs activity that involves a reallocation in the original production function. Recall that the portion of the tobacco budget pertaining to capital replacement, or machinery and equipment fixed costs, is allocated to the value added category for proprietary income. For this activity, this portion of the budget is reallocated to the farm machinery and equipment sector (sector 309). In keeping with normal input-output practice, these costs were not assigned to any sector when the production function change was made. However, an argument can be made for assigning the costs in this fashion when using the expenditure pattern method. This round of expenditures will assume this budget item will be used to purchase new and replacement farm equipment[104]. The addition of the farm machinery and equipment sector to the

[103]The allocation of only a portion of the activity level does not pose a problem, because the other activities have cooperating activity levels. Thus, when the activities are summed together they account for the entire impact being measured. Also note the care in not calling the activity levels the change in final demand; they are not synonymous.

[104]Not every farm will buy new equipment for the amount of this budget allocation. However, the assumption being made is that, in any given year, some farms will buy new equipment for more than the budgeted amount, in order to replace the equipment they are retiring. On average, across all farms, these purchases will be equivalent to the budget allocation for each farm.

activity, despite a large conversion rate of .1718, ends up not becoming a significant factor in the Southside economy, because the sector is not present in the Southside economy[105]. The reallocation is not insignificant to the final result, however, because had it remained in proprietary income without further change, its portion of the final demand would have been allocated to the 'medium' personal consumption expenditures activity, with perhaps an incorrect measure of contribution to the regional economy.

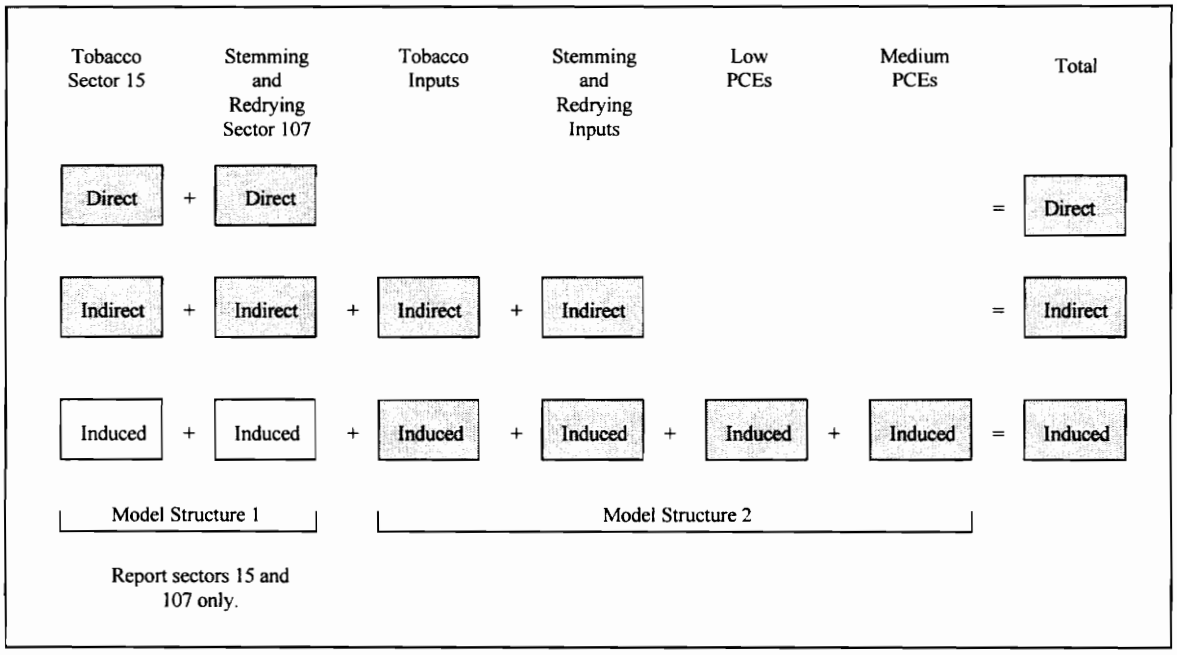
The 'medium' personal consumption expenditures (PCE) activity is one of two activities used to represent personal consumption expenditures. This represents spending patterns for households with annual incomes of $20,000 to $50,000 (MIG, Inc., p. 81). The second activity, 'low' PCE, represents households with lower annual income levels. PCEs are described earlier. Recall that PCEs are supplied with the IMPLAN database and that the conversion rate for each sector is predetermined. Both the 'low' and 'medium' PCE activities have 317 sectors, but with different conversion rates, that sum in total to '1.0'[106].

The activity levels for the EXPEND scenario can help begin to illustrate how the structure of this model works. Referring back to Table 6.8, the tobacco inputs activity has an activity level of approximately $85 million, but only 57 percent of this is allocated. Similarly, only about 7 percent of the $585 million activity level for the stemming and redrying inputs activity is allocated. Finally, $16 and $56 million are allocated in full to the 'low' and 'medium' PCE activities, respectively.

The rationale for the rather complex second model structure is due to the desire to try to

[105]According to the IMPLAN database, there are no farm machinery and equipment manufacturers located in the regional economy. This does not preclude the existence of farm machinery and equipment retailers in the region. However, different kinds of retail operations are not disaggregated in the IMPLAN database, making it difficult to isolate any impacts on farm machinery and equipment retailers.
[106]More sectors are present in the two PCE activities than exist in the Southside economy. Thus, some expenditures are treated the same as if the sector has a regional purchase coefficient of zero, meaning there is no contribution to the regional economy.

estimate the induced effects as accurately as possible. Thus, the second model structure combines both the expenditure pattern method and MIG Inc.'s alternative induced effect calculation method, both introduced in Chapter IV. The second model structure measures the direct, indirect and induced effects for inputs for all sectors other than 15 and 107, and also measures the induced effects for sectors 15 and 107. To compile the entire results of the impact, or the total effects, the first model structure must also be used to provide the direct and indirect effects for just sectors 15 and 107[107]. Figure 6.2 illustrates schematically how the total effects are obtained from both model structures.



Note: The gray shaded boxes indicate those boxes used in the calculation of the total effects. In this situation the totals for sectors 15 and 107 are the only portions used from Model Structure 1 in the calculation of the total effects.

Figure 6.2 Schematic of the First and Second Model Structures Combined to Calculate the Total Effects

To provide an example of the combined model structure approach, note that the GALE

[107]While the first model structure reports direct, indirect and induced effects for all of the sectors, only the direct and indirect effects for sectors 15 and 107 are added to the final result from the second model structure.

and EXPEND scenarios are designed to be somewhat comparable. However, a quick review of the allocations of the activity levels and conversion rates indicates that the EXPEND scenario has a much lower net total allocation. To obtain the complete impact for the EXPEND scenario, the direct and indirect effects of sectors 15 and 107 from the GALE scenario are also needed to obtain the final results. This final result is now comparable to the direct, indirect and induced effects of the GALE scenario for all sectors.

All of the scenarios employing the second model structure must have a scenario from the first model structure to provide the direct and indirect effects of sectors 15 and 107. The activity levels for the first model structure survey will differ depending on the situation. Appendices 5.1 through 5.5 provide the calculations that combine the results from both model structures to find all of the effects of the impact being measured. Table 6.9 provides a summary of these results.

Table 6.9 Scenario Summary Measures Resulting from the Change in Final Demand

Scenario	Tobacco Output ($ Millions)	Stemming & Redrying Output ($ Millions)	Total Output ($ Millions)	Total Value Added ($ Millions)	Employment (Jobs)
FARMING	84.9592	0.0172	201.1967	123.1258	6482.31
GALE	84.9583	584.8559	846.0023	307.4914	8762.35
EXPEND (1)	85.3160	584.8461	780.8316	266.2127	7384.21
EXPENDR (1)	85.3103	584.8420	757.4625	251.3935	6889.40
ABSENTEE (1)	85.3100	584.8418	756.2912	250.6507	6864.69
MRKTSHR (2)	85.3115	643.3255	820.0451	268.6290	7077.06
QUOTA10 (3)	76.7790	526.3575	680.6622	225.5856	6178.23
RPROFIT (4)	85.3088	584.8410	751.6741	247.7227	6767.31
NOQUOTA (5)	127.9610	877.2598	1118.4149	365.8156	9959.10

(1) Takes the scenario total effects plus direct and indirect effects for sectors 15 and 107 from GALE.
(2) MRKTSHR total effects plus direct and indirect effects for sectors 15 and 107 from MRKTINI.
(3) QUOTA10 total effects plus direct and indirect effects for sectors 15 and 107 from QUOTAINI.
(4) RPROFIT total effects plus direct and indirect effects for sectors 15 and 107 from GALE.
(5) NOQUOTA total effects plus direct and indirect effects for sectors 15 and 107 from NOQUOINI.

While Table 6.9 provides the results, the intention of each scenario and the determination of the activity levels must be explained before the results are interpreted. Before this commences, three other details in the general set-up of the model need to be explained. First, the activity levels originated from 1995 output levels for the tobacco and tobacco stemming and redrying sectors. These are deflated to 1992 prices using the consumer price index[108]. Second, the two basic model structures use the IMPLAN *local purchase coefficient* (LPC) feature differently. For the first model structure, the two activities both have LPC set equal to 'N'. This means that the regional purchase coefficient for each sector is not used in the determination of the direct effects round; this is the same as if the regional purchase coefficient equals '1.0'. For the second model structure all four activities have the LPC set equal to 'Y'. This means that the regional purchases coefficients for each sector are used in the determination of the direct effects round. These two details help to explain the activity levels used in each scenario. Finally, Roberts (1994) addresses issues about changes in quota-controlled output, indicating they are not equivalent to changes in final demand. All of the activity levels are designed to address this issue. Desired tobacco quota output levels are adjusted to final demand figures after considering intermediate demand by the tobacco stemming and redrying sector. In all cases, the desired level of output for the tobacco and tobacco stemming and redrying sectors is found in the outcome, indicating the correct level of final demand is used. The issue Roberts addresses becomes relevant if multipliers are desired from these results.

VI.6.2 Scenario Descriptions and Results

This section is divided into two parts. Scenarios related to measurement of the tobacco-related economic contribution in the Southside *study region* are addressed in section

[108]IMPLAN has its own deflators that are unique to each sector. The consumer price index deflates the numbers slightly more for sectors 15 and 107. However, use of the consumer price index brings more consistency in the comparison of different scenarios using the two different basic structures, than if each IMPLAN sector deflator is used.

VI.6.2.1. Those scenarios intended to measure some of the regional economic adjustments that could be experienced as a result of different changes to the tobacco industry in the future are addressed in section VI.6.2.2.

VI.6.2.1 Tobacco-Related Economic Contribution

The intention of the second scenario, GALE, is to use what is believed to be the general approach of the Gale (1994) study for measuring the regional contribution of tobacco. The first scenario, FARMING, uses the same approach, but ignores the presence of the stemming and redrying industry in the *study region.* This allows the ripple effects of tobacco production on the regional economy to be isolated. The FARMING scenario activity level of $84.5430 million for sector 15 (Table 6.8) is 1995 tobacco output (Table 6.3) deflated to 1992 prices[109]. The GALE scenario begins with the 1995 stemming and redrying output (Table 6.4) deflated to 1992 prices. This is further reduced for the *feedback effect* of the use of its own output as an input, to obtain the $520.1653 million activity level for sector 107 (Table 6.8)[110]. Like the Gale approach, the stemming and redrying use of regional tobacco is deducted from the FARMING scenario activity level for sector 15[111]. This result is further reduced for the feedback effect of the use of its own input in order to obtain the activity level of $46.2738 million used for the sector 15 activity (Table 6.8)[112].

The object of the FARMING and GALE scenarios is to measure the existing economic contribution of the regional tobacco industry. Thus, one check on the accuracy of the activity levels used is to see if the output measures generated by the scenario are at the

[109]The 1995 levels are divided by a deflator of 1.08624 in order to obtain the levels at 1992 prices.
[110]The feedback effect is simply part of the process of determining final demand from output. Feedback in this case refers to intermediate input use. The regional absorption coefficient for sector 107 input in sector 107 is used for this calculation.
[111]The regional absorption coefficient for sector 15 input in sector 107 is used for calculating this deduction.
[112]The regional absorption coefficient for sector 15 input in sector 15 is used for this calculation.

1995 levels. The tobacco output, and stemming and redrying output, for the FARMING and GALE scenarios are found in Table 6.9. In this case, these results, as desired, are only insignificantly larger than the 1995 output levels, deflated to 1992 prices, explained above. The total output, value added and employment results for the FARMING and GALE scenarios are found in the same table. However, the GALE scenario results will be improved. This is the intention of the EXPEND, EXPENDR and ABSENTEE scenarios. Each of these scenarios implement an additional improvement, building to the ABSENTEE scenario as this study's final forecast of the economic contribution of the tobacco industry to the Southside *study region.*

Unlike the GALE scenario, the activity levels for the tobacco inputs and stemming and redrying inputs activities in the EXPEND scenario use their respective 1995 output levels, reduced to 1992 prices. Recall that there is no need to reduce these levels for feedback since sector 15 and 107 have been removed. Determination of the activity levels for the remaining two activities is more complicated. Table 6.10 provides the detail for the calculation of both of the personal consumption expenditure activity levels. The table first indicates the adjusted production function proportions for the input and value added categories of sectors 15 and 107. Next, the table indicates that portion of each value added category that is allocated to the two personal consumption expenditure levels. An important assumption made is that only the employee compensation portion of value added for the stemming and redrying sector is allocated to personal consumption expenditures. Since these are publicly traded companies, it is likely that most of the owners live outside of the region. Thus, the proprietary income and other property income categories of value added are likely to be distributed outside the region[113]. Tobacco proprietors, on the other hand, live in the region. Thus, their income is allocated to personal income expenditures.

[113]Some of this income is likely to be reinvested by the company rather than being distributed to shareholders. However, it may be invested in other regions as well. This form of capital investment is usually left out of input-output analysis. Inclusion of any amount here would be speculative.

Table 6.10 Allocation of Personal Consumption Expenditures to Low or Medium Income Levels

	%	%	%	%	%	$ Millions	$ Millions	$ Millions
Sector 15:						84.5430		
	Prod. Fcn.	Farm Mach. & Equip.	Tobacco		Final Prod. Function	Allocation of Activity	PCE Low	PCE Med.
All Inputs	0.40445	0.17181	-0.00164		0.57462	NA		
Employee Comp.	0.19240				0.19240	16.2661	16.2661	
Proprietary Inc.	0.20083	-0.17181			0.02902	2.4534		2.4534
Other Prop. Inc.	0.20232				0.20232	17.1047		17.1047
Subtotal	1.00000				0.99836	35.8243	16.2661	19.5582
Sector 107:						584.8430		
	Prod. Fcn.	Value Added	Tobacco	Stem. & Redrying	Final Prod. Function	Allocation of Activity	PCE Low	PCE Med.
All Inputs	0.74662		-0.56726	-0.1106	0.06876	NA		
Employee Comp.	0.06210				0.06210	36.3188		36.3188
Indirect Taxes	0.00196	-0.00196			0.00000	*		
Proprietary Inc.	0.00306	-0.00306			0.00000	*		
Other Prop. Inc.	0.18626	-0.18626			0.00000	*		
Subtotal	1.00000				0.13086	36.3188	0.0000	36.3188
Total	2.0000				1.1292	72.1430	16.2661	55.8769

NA Not applicable to the calculation of the personal consumption expenditure allocations.

* No allocation by assumption.

Note: This table shows the allocation of the change in final demand to the low or medium personal consumption expenditure (PCE) pattern. Different value added portions of the production functions for tobacco (sector 15) and tobacco stemming and redrying (sector 107) are used as the basis of allocation.

The results from the table indicate that there are approximately $16 million in low income personal consumption expenditures, and nearly $56 million of medium income personal consumption expenditures. The remaining adjustments to the EXPENDR and ABSENTEE scenarios further reduce the activity levels for these personal consumption expenditures.

The EXPENDR scenario reduces the personal consumption expenditure levels for payroll deductions and savings. Table 6.11 provides the calculation of these reductions in

Table 6.11 Estimated Payroll Deduction and Savings Levels

Deduction	H2A Laborers (%)	Seasonal Laborers (%)	Domestic Laborers (%)	Low PCE (%)	Medium PCE (%)
Medicare	0.0000	0.0145	0.0145		0.0145
Social Security	0.0000	0.0620	0.0620		0.0620
State Income Tax	0.0000	0.0000	0.0400		0.0500
Federal Income Tax	0.0000	0.1500	0.1500		0.1800
Savings	0.5000	0.2500	0.0300		0.0300
Subtotal	0.5000	0.4765	0.2965		
Allocation	50.00 %	20.00 %	30.00 %		
Final Deduction Rate	0.2500	0.0953	0.0889	0.4342	0.3365
(1-deduction rate)				0.5658	0.6635
Previous PCE Levels ($ Millions)				16.2661	55.8769
Revised PCE Levels ($ Millions)				9.2025	37.0743

expenditures. For both the 'low' and 'medium' personal consumption categories, payroll withholding percentages are based on approximations for the income level. In order to estimate the deductions for the low expenditure level, used for tobacco production laborers, a breakdown was made for the different categories of laborers and their unique deduction pattern. The savings rate of 25 percent used for seasonal laborer is based upon a survey result for the Eastern Shore of Virginia (Sills, Alwang and Driscoll, p. 221). This same study indicated that the savings rate for H2A laborers is even higher. A 50 percent savings rate is used for these workers, making their total level of deduction only a few percent more than the seasonal laborers[114]. Lastly, a domestic savings rate of three

[114]This savings rate is an assumption made by the author. H2A laborers have only short-term working permits. It is anticipated that they have a high level of savings in order to make occasional remittances to relatives outside the country, or to take with them when they leave the country. The assumed H2A level of savings leads to a total rate of deduction only slightly higher than the rate for seasonal laborers.

percent is used, leaving domestic workers with total deductions of approximately one-third of their wages.

Table 6.11 provides a revised low personal consumption expenditure activity level of approximately $9 million and a medium personal consumption expenditure activity level of $37 million. These activity levels are used in the EXPENDR scenario (Table 6.8).

The remaining adjustment to personal consumption expenditures is for expenditures made outside the *study region* for income that goes to absentee quota owners. The calculation of this revised activity level in the ABSENTEE scenario is provided in Table 6.12. The allocation in the table used for the quota rental portion of income reflects the absentee owner rate of 11.3 percent compiled from government reports (Table 4.18). Based on these estimates, expenditure losses from the *study region* due to absentee quota ownership is approximately $1.28 million (1992 dollars)[115]. Note that this level of loss is already reduced by payroll and savings deductions. The final result for the ABSENTEE scenario is a reduced medium personal consumption expenditure activity level of $35.8 million (Table 6.8).

Having established the activity levels for the EXPEND, EXPENDR and ABSENTEE scenarios, and their purpose, the results of the scenarios can be examined. An important check on the accuracy of the activity levels is that the output for the tobacco and stemming and redrying sectors is the same for these three scenarios as for the GALE scenario, that is, the deflated output level begun with (Table 6.9). The next point to note is that the totals for total output, total value added and employment all decrease for each

[115]Of the 37.074 million dollars of medium personal consumption expenditures in the EXPENDR scenario, 11.349 million dollars pertain to quota rentals. The absentee quota owner portion of quota rentals, using the 11.3 percent rate, is 1.280 million dollars. The EXPENDR scenario medium personal consumption expenditure activity is reduced by this 1.280 million dollars to obtain the activity level for the ABSENTEE scenario.

of the three scenarios. The decrease is expected given the declining activity level of personal consumption expenditures.

Table 6.12 Regional Personal Consumption Expenditure Losses Due to Absentee Quota Ownership

Medium PCE Category	Activity Level ($ Millions)	Allocation	Revised Activity Level ($ Millions)
Management Returns	1.62786	1.000	1.62786
Quota Rental	11.34900	.887	10.06656
Stemming & Redrying Employee Compensation	24.09749	1.000	24.09749
Total	37.07435		35.79191

The most important result is the statistics for the ABSENTEE scenario. This study estimates that in 1995, the tobacco industry contributed approximately $756 million in total output, $251 million in total value added, and over 6,800 jobs to the Southside *study region* (1992 dollars). These results stand in contrast to the results of the GALE scenario. Calculating alternative induced effects by carefully allocating the disposition of value added income as personal consumption expenditures leads to lower results than those from IMPLAN's Type III induced effects. Table 6.13 provides several comparisons of the changing levels for the different scenarios. The ABSENTEE scenario has approximately $90 million, or 10.6 percent, less output than the GALE scenario. Similarly, ABSENTEE has nearly $57 million, or 18.5 percent less in total value added. Finally, the largest difference between the two scenarios is in jobs generated. ABSENTEE generates almost 1900 less jobs, or 21.7 percent less than the GALE scenario result. Although the ABSENTEE scenario generates smaller numbers than the GALE scenario, they are by no means insignificant to the *study region*, an issue that will be addressed later.

Table 6.13 Net Change in Summary Results for the Regional Economic Contribution Scenarios

Scenario	Tobacco Output ($ Millions)	Stemming & Redrying Output ($ Millions)	Total Output ($ Millions)	Total Value Added ($ Millions)	Employment (Jobs)
FARMING (BASE)	84.9592	0.0172	201.1967	123.1258	6482.31
GALE	*	+ 584.8387	+ 644.8056	+ 184.3656	+ 2280.04
GALE (BASE)	84.9583	584.8559	846.0023	307.4914	8762.35
EXPEND	*	*	- 65.1707	- 41.2787	- 1378.14
EXPENDR	*	*	- 88.5398	- 56.0979	- 1872.95
ABSENTEE	*	*	- 89.7111	-56.8407	-1897.66

Source: Calculations made using Table 6.9 summary results.

* The net difference is insignificant. No difference is expected in these cases, but a small difference exists due to rounding and feedback effects that are not eliminated by the scenario structure.

Other findings are possible if the intermediate scenarios reflecting the build-up to the ABSENTEE scenario are also examined. A comparison of the measures for the net change between the ABSENTEE and EXPENDR scenarios indicates that the impact of absentee quota ownership has a relatively small negative result on the *study region* economy. Total industry output falls by $1.17 million, total value added decreases by $0.74 million and employment losses total 24 jobs. These results are all less than four-tenths of a percent of the total contribution for each measure found by the ABSENTEE scenario[116]. Keep in mind that these are estimates that rely on the assumptions made in their computation. However, the general level of the results provides support for a contention that significant concern about the negative regional economic impact of absentee quota ownership is unnecessary. Note, however, that this does not address the issue of within-region quota owners who do not themselves produce tobacco. This is a separate issue, not addressed by this study.

[116]These percentages are .15 percent of total industry output, .3 percent to total value added, and .36 percent of jobs.

A potentially larger regional economic loss than absentee quota ownership pertains to savings or expenditures made by seasonal and H2A laborers outside of the region. This amount is not directly quantified by the study, but savings estimates for these laborers result in a larger decrease in the low personal consumption expenditure activity than the absentee quota ownership result for the medium personal consumption expenditure activity[117]. Any calculation of the regional losses from the employment of seasonal and H2A laborers versus domestic laborers has to consider that these laborers may be freeing domestic laborers to work in more productive jobs, increasing the net contribution to the *study region*. This consideration and other social policy implications pertaining to these laborers is beyond the scope of this study.

The savings losses of the seasonal and H2A laborers is part of a larger calculation of savings and payroll deduction losses. This is represented by the net change between the EXPEND and EXPENDR scenarios. Perhaps the payroll and savings deductions should not all be perceived as causing 'losses' from the regional economy. However, any benefits that may accrue from these deductions are not easily captured in an input-output model. It is important, though, to remove these deductions from the personal consumption activity levels. Otherwise, the economic contribution being measured will be overstated, because these sums are not immediately consumed. Note also that the approach used by this study allows different deduction patterns for groups of laborers to be considered, something the IMPLAN Type III induced effect calculation does not allow. The net change for these deductions is $23.4 million less in total industry output, $14.8 million less in total value added, and 495 less jobs.

The largest incremental change in the summary results is the difference between the GALE scenario and the EXPEND scenario. Part of this reflects the different approaches

[117]From Table 6.11 a reduction of 2.85 million dollars in the low personal consumption expenditures activity level can be calculated. The compares to absentee quota ownership causing a 1.28 million dollar decrease in the medium personal consumption expenditures activity level.

used by both scenarios. Recall that Chapter V explained how the IMPLAN Type III induced effect is calculated. The IMPLAN Type III induced effect first finds population growth estimates associated with job creation from the direct and indirect effects. The additional demand generated by the new population spending at an average per capita income rate creates the induced effect. The assumptions in the Type III calculation will overstate the induced effect for the tobacco industry. Since many of the jobs created in the tobacco industry are lower-paying, or of shorter duration, than the regional average, the calculation overstates the induced effect. The GALE scenario uses the IMPLAN Type III induced effect, while the EXPEND scenario uses the previously described alternative technique. This technique, before any of the additional adjustments made in the EXPENDR and ABSENTEE scenarios, results in $65 million less in total output, $41 million less in total value added, and 1378 less jobs (Table 6.13).

Table 6.13 provides one other comparison. Although the GALE scenario has inflated numbers, it uses the same method as the FARMING scenario. Thus, the differences between the two scenarios gives a relative indication of the importance of the stemming and redrying industry to the *study region*, especially if percentages are examined. Total output increases by $645 million, or 320 percent of the tobacco industry level, due to the contribution of the stemming and redrying industry. This is an unrealistically positive measure, given that a large portion of this output is imported tobacco inputs. A more meaningful figure is the $184 million, or 150 percent, increase in value added due to the industry's regional presence. Finally, employment increases by 2280 jobs, or by 35 percent. The comparison of the jobs measure draws an important point to light. Interpretation of the IMPLAN jobs statistics must proceed with caution, since not all jobs are of equal duration and compensation. This issue will be further addressed in the sectoral impacts section, when jobs are examined in more detail. However, the analysis of the comparison of the FARMING and GALE scenarios will close by noting that the

stemming and redrying industry has a very large impact on the *study region*. Any study of the entire regional tobacco industry should not overlook this fact.

VI.6.2.2 Tobacco Industry Adjustments

Four scenarios, MRKTSHR, QUOTA10, RPROFIT and NOQUOTA, have yet to be explained. The intention of these four scenarios is to cover four different kinds of possible change that could occur to the regional tobacco industry. It is important to realize that the activity levels chosen for these scenarios are not forecasts. Instead, the intention is to give an indication of the kind of regional impacts, or adjustments, that will result from the different changes. All of the scenarios reflect adjustments made from the base ABSENTEE scenario environment.

The MRKTSHR scenario intends to simulate a ten percent increase in the production level of the regional stemming and redrying industry[118]. The current quota supply-controlled tobacco production environment still holds. Furthermore, this scenario is modeled without any change in the tobacco quota levels and hence, no change in the regional tobacco production levels. Thus, the change in the stemming and redrying production level is only the result of an increase in market share by the regional industry.

The tobacco inputs and low personal consumption expenditures activities in the MRKTSHR scenario have the same activity levels as the ABSENTEE scenario. The activity level for the stemming and redrying inputs activity simply increases the ABSENTEE scenario level by ten percent, to approximately $643 million (Table 6.8). The medium personal consumption expenditures activity increases its activity level to about $38 million (Table 6.8). This pertains to a 10 percent increase in the sector 107 employee compensation portion of this activity.

[118]No particular policy change is associated with the MRKTSHR scenario. This scenario can just as easily reflect a ten percent loss in production. Thus, the scenario isolates the contribution of the stemming and redrying industry, highlighting the importance of keeping it in the *study region*.

A second scenario, MRKTINI, is necessary to find the direct and indirect effects for sectors 15 and 107. The activity level for sector 15 falls from the level of the GALE scenario, to approximately $42 million, because the stemming and redrying industry is now consuming more inputs (Table 6.8)[119]. Since the regional industry is consuming more of the domestic tobacco, there is less left to export at the same level of production. The sector 107 activity level of $572 million is simply a 10 percent increase over the GALE scenario levels (Table 6.8).

The QUOTA10 scenario intends to simulate a ten percent decrease in the tobacco marketing quota, causing a similar decrease in the tobacco sector production. A further assumption of this scenario is that there is no change in the existing price for tobacco. Although the scale of change may differ, a similar policy decision could be made to support the domestic price in an environment of downward pressure on prices from declining demand or increasing foreign competition. Yet another assumption made in this scenario is that production for the stemming and redrying sector will also decrease by the same ten percent; no foreign tobacco substitution for decreased available domestic input is considered. All of these assumptions make the activity levels for this scenario at simply 90 percent of the ABSENTEE scenario levels (Table 6.8). Similarly, the QUOTAINI scenario that is used to find the direct and indirect effects for sectors 15 and 107 has activity levels at 90 percent of the GALE scenario (Table 6.8).

The intention of the RPROFIT scenario is to examine the impact of the opposite policy decision of that found in the QUOTA10 scenario. Instead of supporting the current price of tobacco by reducing the quota marketing levels, the price level is allowed to drop in order to maintain the production levels. In this case, a ten percent decrease in price is simulated. An assumption made in this scenario is that producers continue to maintain

[119]The regional absorption coefficient for sector 15 in industry 107 is used in making the calculation of this new activity level.

production at the marketing quota level despite the lower prices. Thus, all of the price change goes against the producer's margin, or profit. There is also no change in the stemming and redrying industry production level.

Because both industries maintain their production levels, the activity levels for the two input activities are the same in the RPROFIT scenario as for the ABSENTEE scenario. Employee compensation is also the same for sector 15 so the activity level for the low personal consumption expenditure activity is also unchanged. The medium personal consumption expenditure activity reflects all of the change, decreasing to $30.7 million from $35.8 million in the ABSENTEE scenario (Table 6.8). This new level reflects the assumption that management returns and quota rental returns absorb all of the decrease in price, maintaining only 56.8 percent of their levels found in the ABSENTEE scenario. Finally, the GALE scenario is used for the measure of the direct and indirect effects for sectors 15 and 107, since there is no change in production levels.

The intention of the last scenario, NOQUOTA, is to model Sumner and Alston's (1985) seminal, but dated, estimate of the impact of the elimination of the tobacco program. They forecast a 25 percent decrease in price, and 50 percent increase in production and sales, that would result from the discontinuation of the program. A 25 percent decrease in price is unrealistic for the tobacco budget used in this study, because management and quota returns are a little over 23 percent of the budget. A price decrease of over 23 percent would be below the break-even point. Thus, for this scenario the price falls to this break-even point and production increases by 50 percent. A simplifying assumption is made that production shares remain the same across current geographic production regions. Note, however, that this is an unrealistic assumption for the long-term.

The NOQUOTA scenario activity levels for the two input activities, and the low personal consumption expenditures activity, increase by 50 percent of the ABSENTEE scenario

levels (Table 6.8). Although $11.7 million of medium consumption expenditures are lost with the elimination of management returns and quota rental, the remaining $24.1 million of sector 107 employee compensation increases by 50 percent. This leads to a slight increase over the ABSENTEE scenario level for this activity, to $36.1 million (Table 6.8). Like the other scenarios, an additional scenario is needed for the direct and indirect effects for sectors 15 and 107. The NOQUOINI scenario provides these numbers with activity levels that are 50 percent higher than the GALE scenario (Table 6.8).

A starting point in the analysis of the results for these four scenarios is to note that the output levels for the tobacco and stemming and redrying sectors are at the desired level (Table 6.9). The total industry output, total value added, and employment in jobs measures all behave in the *a priori* expectation for each scenario. Table 6.14 provides the actual net change in each of these measures as compared to the base ABSENTEE scenario results.

Table 6.14 Net Change in Summary Results for the Tobacco Industry Adjustment Scenarios

Scenario	Tobacco Output ($ Millions)	Stemming & Redrying Output ($ Millions)	Total Output ($ Millions)	Total Value Added ($ Millions)	Employment (Jobs)
ABSENTEE (BASE)	85.3100	584.8418	756.2912	250.6507	6864.69
MRKTSHR	*	+ 58.4837	+ 63.7539	+ 17.9783	+ 212.37
QUOTA10	- 8.5310	- 58.4843	- 75.6290	- 25.0651	-686.46
RPROFIT	*	*	- 4.6171	-2.9280	- 97.38
NOQUOTA	+ 42.6510	+ 292.4180	+ 362.1237	+ 115.1649	+ 3094.41

* The net difference is insignificant. No difference is expected in these cases, but a small difference exists due to rounding and feedback effects that are not eliminated by the scenario structure.

When examining the results of Table 6.14, recall that input-output analysis allows the sign to be changed on the results for an impact that goes the other direction. Thus, the MRKTSHR results (a ten percent increase in production) can also be interpreted for a ten

percent decrease in production for the tobacco stemming and redrying industry by simply reversing the signs.

One general result under quota marketing control of tobacco supply can be seen by comparing the results from the QUOTA10 and MRKTSHR scenarios (if the signs are ignored). A ten percent change initiated in the tobacco sector production level (QUOTA10) has a greater impact on the *study region* economy than a similar percentage change in production level initiated in the stemming and redrying sector (MRKTSHR)[120]. The stemming and redrying sector is a forward-linked industry of the tobacco industry. Under the QUOTA10 scenario assumptions, the stemming and redrying sector will also experience a ten percent increase (decrease) in its production level when the tobacco sector production increases (decreases) by ten percent, both the result of the quota level change. Under supply-control, the case of increased (decreased) production in the stemming and redrying sector does not lead to higher (lower) tobacco sector production. In other words, the MRKTSHR scenario assumes that a ten percent increase in the stemming and redrying industry production levels result from processing a larger share of existing tobacco industry production (to the detriment of out-of-region processors). Accordingly, the MRKTSHR scenario results show a smaller regional economic impact than the QUOTA10 scenario, which has a change in production levels for both sectors.

Another general result is found for the relative impact of two annual decisions made by the USDA that establish quota marketing levels and support prices. Comparing the net change in the QUOTA10 and RPROFIT scenarios shows that a ten percent change in the quota level has a much larger impact than a ten percent change in the price level[121]. It is important not to infer from this comparison that there is a one-for-one trade-off between

[120]This again assumes that substitution with foreign imports of tobacco does not occur.

[121]While the QUOTA10 scenario net change in output, valued added and jobs is simply a ten percent factor of the ABSENTEE scenario base, the same is not true for the RPRICE scenario. When prices are involved, the net change in all of the same measures with respect to the ABSENTEE scenario base is smaller, but with variation in the percentage change for each measure.

the quota and price levels established by the USDA. All that is inferred is that the regional economy is more sensitive to changes in the quota level. Note, however, that this assessment ignores differences in important distributional effects of these changes. For example, tobacco producers bear the brunt of any price change, and thus their welfare is very sensitive to price changes.

Distributional issues become even more important when the results of the NOQUOTA scenario are evaluated. The results indicate that the regional economy on the whole is much better off without the restrictions of the tobacco program. On the other hand, tobacco producers would face tremendous adjustments. Note that this is perhaps the most unrealistic of the scenarios. For example, the scenario is highly dependent on the assumptions previously noted. Also not considered are any capacity constraints in the economy. It is likely that an increase in production of this magnitude will require some level of substitution away from the production of other commodities or from other labor processes. Any focus on the forecast increase in jobs also needs to consider the nature of the jobs created. Many of them would undoubtedly go to migrant and H2A laborers if current labor patterns are maintained. Consideration of these relevant offsets is beyond the scope of this study. Overseas markets are also more competitive now than at the time of the Sumner and Alston assessment used as the basis for this scenario. While the foreign export market is a critical component of total tobacco production today, a more current assessment of the foreign export possibilities is needed before the results of this estimate can be more seriously considered. The basic and logical point made by the NOQUOTA scenario is that more production of the labor and input intensive tobacco commodity, even with reductions in the price received, is beneficial to the economy. Comparisons using similar impacts conducted for other commodities would provide further enlightenment in this area.

VI.6.3 Sectoral Impacts

The purpose of this section is to look at the results at a more detailed level than the summary totals for each measure. The ABSENTEE scenario, the base *study region* economic contribution measure, will be examined more than the other scenarios, but details will also be provided for the QUOTA10, RPROFIT and NOQUOTA scenarios. A beginning point is to examine the ABSENTEE scenario for a measure that is commonly requested: jobs.

The fact that tobacco-related industries, and their ripple effects, account for over 6800 jobs in the Southside *study region* has been previously noted. Table 6.15 ranks the 15 sectors that have the highest job contribution out of this total. The table also indicates their relative share of the total. Not surprisingly, the tobacco and tobacco stemming and redrying sectors are the largest job contributors, with over 76 percent of the total. More surprising is the level of accuracy of the number of jobs provided for the stemming and redrying industry. The scenario result of 1163 jobs (Table 6.15) compares favorably with the stemming and redrying survey result of 1152 jobs (Table 4.26).

The third highest ranking sector, motor freight transport and warehousing, should capture many of the jobs located at the tobacco warehouses, given its standard industrial classification code assignments. Recall that the survey response for half of the warehouses responding indicated that 159 jobs are generated by these operations (Table 4.21). Thus, the job total for this sector may be understated. Part of the problem here is due to the shorter-term, seasonal nature of the tobacco warehouse employment compared to the sector as a whole. Accordingly, IMPLAN conversion ratios of output to jobs for this sector will tend toward understatement. Nevertheless, the ranking as the third job-contributing sector appears to be correct.

Table 6.15 Sectors with the Greatest Employment Impact (ABSENTEE)

Sector	Sector Name	Number of Jobs	Percent of Total
15	Tobacco	4079.44	59.43
107	Tobacco Stemming And Redrying	1163.04	16.94
435	Motor Freight Transport And Warehousing	196.85	2.87
454	Eating & Drinking Establishments	134.88	1.96
492	Hospitals	119.14	1.74
450	Food Stores	84.57	1.23
447	Wholesale Trade	79.34	1.16
56	Maintenance And Repair Other	71.15	1.04
455	Miscellaneous Retail	66.37	0.97
490	Doctors And Dentists	56.98	0.83
491	Nursing And Protective Care	54.42	0.79
451	Automotive Dealers & Services	49.67	0.72
449	General Merchandise Store	48.95	0.71
456	Banking	37.85	0.55
525	Household Industry-low Income	30.63	0.45
	Subtotal	6273.28	91.38
	Other Sectors	591.41	8.62
	Total	6864.69	100.00

It is difficult to substantiate the ranking and number for the other sectors listed in Table 6.15. Some of the sectors such as eating & drinking establishments, hospitals, and food stores, reflect sectors supported by personal consumption expenditures of employees of the tobacco-related industries. A few other sectors may be tied to direct support for the tobacco-related industries, such as the maintenance and repair sector. At these lower levels of ranking, employment (jobs) tends to be more evenly distributed across a broad range of sectors.

One issue not covered by the jobs measure is the quality of the jobs, a growing area of concern in today's economy. The employment, or jobs, issue can be examined in more

detail with statistics from the ABSENTEE scenario. A relevant comparison is the total amount of employee compensation for each sector. A complication of IMPLAN's use of jobs, not necessarily full-time equivalent jobs, is that the quality of the jobs becomes more difficult to assess. A further complication for the tobacco industry is the possibility of classification problems between employee compensation and proprietorship income. In any case, a comparison of the tobacco industry and stemming and redrying industry is revealing. Although the stemming and redrying sector has far fewer jobs than the tobacco sector, it still has $20 million more in employee compensation. Total employee compensation is approximately $16 million for the tobacco sector and $26 million for the stemming and redrying sector. According to these figures, average compensation per job is approximately $4000 and $31,000, for these respective sectors.

Other measures besides jobs and employee compensation can be examined. The last level of more detailed analysis of the scenario results uses sectoral aggregations based upon the first digit of the primary standard industrial classification code associated with each IMPLAN sector. Results are provided for not only jobs and employee compensation, but also for final demand, total industry output, property income, and total value added. Table 6.16 provides these measures of the regional economic contribution of tobacco-related industries as determined by the ABSENTEE scenario results.

The most noticeable result from Table 6.16 is that manufacturing is the highest-ranked category for all of the measures except jobs, and usually by a wide margin. This may be considered a surprising result for a study focusing on agricultural tobacco production. However, the agriculture category is ranked second for all of the measures other than jobs, where it ranks first.

Table 6.16 ABSENTEE Scenario Tobacco Industry Impacts Aggregated by 1-Digit Standard Industrial Classification Code

Category	Final Demand ($ Millions)	Total Industry Output ($ Millions)	Employee Comp. Income ($ Millions)	Property Income ($ Millions)	Total Value Added ($ Millions)	Employment (Number of Jobs)
Agriculture, Forestry & Fisheries	47.579	86.49	16.5937	34.89	51.4889	4111.16
Mining	0.0015	0.0061	0.0021	0.0015	0.0038	0.07
Construction	2.8332	5.1412	1.4651	1.0195	2.5055	76.25
Manufacturing	524.5449	591.094	38.031	111.5375	150.7573	1240.63
Transportation, Communications & Utilities	16.2872	20.3285	5.7717	4.2733	10.8009	231.41
Trade	14.8265	15.8265	6.8586	1.897	11.3818	518.96
Finance, Insurance & Real Estate	11.7068	13.4223	1.5084	4.3864	8.0477	86.29
Services	19.1726	21.4349	9.669	4.169	14.1335	574.66
Government	1.9885	2.5472	0.7823	0.7476	1.5309	25.24
Inventory Adjustment	0	0	0	0	0	0
Total	638.9402	756.2907	80.6819	162.9218	250.6503	6864.67

Source: A compilation of results from various IMPLAN 903, 904 and 906 Reports.

Another finding from this table is that the regional influence of the tobacco-related industries falls across a wide range of sectors in the *study region* economy. Further analysis of this table answers the question of who is impacted by the presence of this industry. A table aggregated on the same basis for the entire Southside *study region* economy allows a comparison of the relative contribution by category to be made (Table 6.17)[122]. Table 6.18 provides the percentages of the ABSENTEE scenario contribution, relative to the economy as a whole, for each measure. This comparison is not entirely valid, because the 1995 tobacco-related industries contribution is being compared to the 1992 economy. Recall that the tobacco-related industries have higher production in 1992.

[122]Table 6.17 is the same table as Table 4.5, except that small differences are found due to the change in sector 15's production function.

Table 6.17 Adjusted 1992 Southside *Study Region* Base Economy Aggregated by 1-Digit Standard Industrial Classification Code

Category	Final Demand ($ Millions)	Total Industry Output ($ Millions)	Employee Comp. Income ($ Millions)	Property Income ($ Millions)	Total Value Added ($ Millions)	Employment (Number of Jobs)
Agriculture, Forestry & Fisheries	163.7731	235.3529	35.2078	90.8611	127.6408	8022
Mining	13.2776	13.6312	4.3797	3.1744	8.2069	163
Construction	448.3932	556.4825	127.8335	94.6647	224.301	7503
Manufacturing	3090.283	3638.603	705.6609	481.3007	1215.926	27045
Transportation, Communications & Utilities	97.0241	280.5863	77.5569	66.3595	157.7644	2788
Trade	443.0554	531.0553	233.6244	64.5338	384.6404	17897
Finance, Insurance & Real Estate	446.8154	519.9003	53.7663	185.4292	321.0625	3248
Services	618.301	739.0963	335.0485	143.4768	487.9536	21016
Government	403.663	436.5331	379.1284	22.4766	401.6344	15599
Inventory Adj.	0	-3.9536	0	-3.9536	-3.9536	0
Total	5724.587	6947.287	1952.207	1148.323	3325.176	103281

Source: IMPLAN 901 Report.

A few new results can be deduced from Table 6.18. The contribution of tobacco-related industries is most significant on a relative basis to the agriculture and manufacturing categories. However, the transportation, communications and utilities category also rises in significance. This is due to the relevance of the previously noted motor freight transport and warehousing sector in this category. Finally, the trade, finance, and services categories have fairly even relative contributions across measures in the two to three percent range. The mining, construction, and government categories have less relative contribution from the tobacco-related industries.

Table 6.18 ABSENTEE Scenario Results as a Percentage of the Southside *Study Region* Base Economy

Category	Final Demand ($ Millions)	Total Industry Output ($ Millions)	Employee Comp. Income ($ Millions)	Property Income ($ Millions)	Total Value Added ($ Millions)	Employment (Number of Jobs)
Agriculture, Forestry & Fisheries	29.05	36.75	47.13	38.40	40.34	51.25
Mining	0.01	0.04	0.05	0.05	0.05	0.04
Construction	0.63	0.92	1.15	1.08	1.12	1.02
Manufacturing	16.97	16.25	5.39	23.17	12.40	4.59
Transportation, Communications & Utilities	16.79	7.25	7.44	6.44	6.85	8.30
Trade	3.35	2.98	2.94	2.94	2.96	2.90
Finance, Insurance & Real Estate	2.62	2.58	2.81	2.37	2.51	2.66
Services	3.10	2.90	2.89	2.91	2.90	2.73
Government	0.49	0.58	0.21	3.33	0.38	0.16
Inventory Adj.		0.00		0.00	0.00	
Total	11.16	10.89	4.13	14.19	7.54	6.65

Source: Calculated by taking Table 6.16 as a percentage of Table 6.17.

Three more tables for scenarios reflecting possible adjustments to the tobacco industry in the region can also be closely analyzed to see how the simulated changes to the tobacco-related industries can influence different categories of the economy (Tables 6.19, 6.20 and 6.21). Comparison of these tables to Table 6.16 and Table 6.17 would indicate the relative change by sector from the original base total tobacco-related contribution, and the new contribution as a percentage of the economy as a whole. This provides fairly similar results across categories to those already noted, but with slight variation for the different impacts.

Table 6.19 QUOTA10 Scenario Tobacco Industry Impacts Aggregated by 1-Digit Standard Industrial Classification Code

Category	Final Demand ($ Millions)	Total Industry Output ($ Millions)	Employee Comp. Income ($ Millions)	Property Income ($ Millions)	Total Value Added ($ Millions)	Employment (Number of Jobs)
Agriculture, Forestry & Fisheries	42.8214	77.8412	14.9341	31.4012	46.3397	3700.02
Mining	0.0014	0.0056	0.0018	0.0013	0.0035	0.05
Construction	2.5499	4.6272	1.3186	0.9176	2.2551	68.63
Manufacturing	472.0909	531.9846	34.2279	100.3837	135.6818	1116.61
Transportation, Communications & Utilities	14.6582	18.2957	5.1945	3.8458	9.7207	208.27
Trade	13.3438	14.2439	6.1728	1.7073	10.2436	467.07
Finance, Insurance & Real Estate	10.536	12.0799	1.3575	3.9478	7.243	77.66
Services	17.2557	19.2919	8.7022	3.752	12.7203	517.2
Government	1.7897	2.2924	0.7041	0.6729	1.3778	22.74
Inventory Adjustment	0	0	0	0	0	0
Total	575.047	680.6624	72.6135	146.6296	225.5855	6178.25

Every economic variable, for every category, in the quota reduction scenario shown above is ten percent lower than the respective measures provided in the ABSENTEE scenario (Table 6.16).

Table 6.20 RPROFIT Scenario Tobacco Industry Impacts Aggregated by 1-Digit Standard Industrial Classification Code

Category	Final Demand ($ Millions)	Total Industry Output ($ Millions)	Employee Comp. Income ($ Millions)	Property Income ($ Millions)	Total Value Added ($ Millions)	Employment (Number of Jobs)
Agriculture, Forestry & Fisheries	47.5563	86.4562	16.5871	34.8714	51.4633	4110.36
Mining	0.0015	0.006	0.002	0.0014	0.0038	0.07
Construction	2.8332	5.0035	1.4261	0.9923	2.4389	74.19
Manufacturing	524.3113	590.7433	37.9364	111.4935	150.6172	1235.58
Transportation, Communications & Utilities	16.0953	20.0526	5.7	4.1961	10.6348	228.93
Trade	13.7644	14.7288	6.3802	1.7608	10.6022	480.25
Finance, Insurance & Real Estate	10.8375	12.4421	1.4157	4.0346	7.4428	80.94
Services	17.6908	19.841	8.9402	3.8607	13.077	533.24
Government	1.8744	2.4005	0.7342	0.7079	1.4426	23.68
Inventory Adjustment	0	0	0	0	0	0
Total	634.9647	751.674	79.1219	161.9187	247.7226	6767.24

Note that the profit reduction scenario results in only slight reductions in values of the economic variables, as compared to the base ABSENTEE scenario (Table 6.16).

Table 6.21 NOQUOTA Scenario Tobacco Industry Impacts Aggregated by 1-Digit Standard Industrial Classification Code

Category	Final Demand ($ Millions)	Total Industry Output ($ Millions)	Employee Comp. Income ($ Millions)	Property Income ($ Millions)	Total Value Added ($ Millions)	Employment (Number of Jobs)
Agriculture, Forestry & Fisheries	71.2887	129.6169	24.8674	52.2703	77.1453	6164.01
Mining	0.0023	0.0088	0.003	0.002	0.0055	0.09
Construction	4.2499	7.2338	2.0624	1.4349	3.5268	107.22
Manufacturing	786.0047	885.4249	56.7201	167.1544	225.6506	1843.49
Transportation, Communications & Utilities	23.7656	29.5348	8.4085	6.1423	15.6248	338.56
Trade	18.5545	19.9304	8.6275	2.3733	14.3671	644.06
Finance, Insurance & Real Estate	14.5435	16.7322	1.9404	5.359	9.9723	110.9
Services	23.6163	26.6218	11.9746	5.183	17.5336	718.32
Government	2.5869	3.3121	1.006	0.9832	1.9903	32.44
Inventory Adjustment	0	0	0	0	0	0
Total	944.6124	1118.4157	115.6099	240.9024	365.8163	9959.09

The table above shows the positive impacts on the economy, compared to the ABSENTEE scenario (Table 6.16), that results from removal of the tobacco program. It is important to reiterate at the end of these summaries that the 1995 production levels for the tobacco and tobacco stemming and redrying sectors are at levels lower than previous years. For this reason, and because of the general approach of this study, it is believed that the results provided by this study are conservative, particularly when compared to other studies that use more standard input-output techniques. Another point to reiterate is a reminder about the assumptions and limitations of input-output analysis. This is particularly important to keep in mind when assessing the results of the scenarios that simulate adjustments to the tobacco-related industries. One result, however, is obvious: the tobacco industry plays a critical role in the Southside *study region*, and the regional economy will be impacted in varying degrees if various policy changes come about.

Chapter VII

Summary and Conclusions

VII.1 Summary

Virginia flue-cured tobacco producers try to make an honest living, most following the practice of their parents before them. Current flue-cured tobacco producers are the survivors of a practice that, not unlike other agricultural commodities, has seen a significant decline in the total number of producers over time. These same producers now find themselves in the unenviable position of producing the input for products that are under very contentious scrutiny and debate. The threat of some form of government or legal intervention poses the possibility of a sudden, negative, shock to an already gradual decline in domestic demand for these products. Compounding the potential changes facing flue-cured tobacco producers is the fact that tobacco is produced under a federal program that uses marketing quotas to control supply. This tobacco program was born in an era much different from today. Actions in today's era appear keen on dismantling government interventions in agricultural production, and the tobacco program may not be immune from such future changes. However, the extent to which

flue-cured tobacco producers benefit from the tobacco program, versus the often different owners of quota marketing rights granted under the program, is another item of debate. Nevertheless, most existing flue-cured tobacco producers believe in the tobacco program, approving its continuation whenever it comes before them for their periodic approval. Whether the tobacco program will continue in the future is an obvious area of concern to flue-cured tobacco producers.

The more than 60 years' existence of the tobacco program has had an important impact on the Virginia flue-cured tobacco-producing regional economy. Restrictions in the transfer of flue-cured quota marketing rights across geographic regions has preserved the traditional practice of raising tobacco in the region. In this way, the tobacco program enforces the retention of Virginia's flue-cured tobacco regional market share, and thus encourages a relatively stable level of regional economic contribution from flue-cured tobacco production. This factor has also encouraged the industry that processes the tobacco commodity to remain in the region. One such industry located in the heart of the Virginia flue-cured tobacco country is the tobacco stemming and redrying industry. Given today's environment, there are rising concerns about the possibility that this stable regional influence provided by tobacco agriculture, and the tobacco industry, is threatened.

This study has examined an area encompassing the strength of the Virginia flue-cured tobacco-producing region, the Southside *study region*. The study addresses objectives that begin to analyze the concerns noted above, and their possible regional economic ramifications. The principal tool selected to achieve these objectives is input-output analysis. Before the objectives are directly addressed, three introductory chapters setup the study. After the introductory chapter, Chapter II presents an in-depth analysis of the current issues facing tobacco producers, as well as a description of the mechanics of the tobacco program. Chapter III addresses the definition of the *study region*, an important,

and often over-looked, decision that determines the accuracy of an input-output study. The chapter defends the selection of a contiguous, and relatively self-contained, six-county region. The regional character, excluding Danville city, can be described as rural, or small-town, south-central Virginia. Although the study area could have been enlarged to include other important tobacco-related industry in the Richmond area and other environs, it intentionally chose not to. This decision prevents losing sight, or overwhelming the measurement, of the impacts in mostly rural Virginia.

The first objective of the study is to 'provide an improved estimate of tobacco's total employment, income, and output contribution (economic indicators) across sectors...' for the *study region*. One part of this objective is to prepare a detailed descriptive analysis suitable for policy makers. Chapter IV provides such an analysis, beginning with a presentation of summary regional demographic information, and a description of the regional economic base. Chapter IV then turns its focus to tobacco. A detailed analysis of tobacco trade patterns, or the economic components of the tobacco product cycle, is conducted. Three components of this product cycle, tobacco production, marketing at tobacco warehouses, and processing at tobacco stemming and redrying operations, occur in Southside Virginia. Each component is examined with regard to its potential regional contribution. In addition to synthesizing existing published information, this analysis incorporates other supplementary data as needed, utilizing interviews, site visits, and surveys for their collection.

Several contributions, believed to be unique to this study, result from this synthesis. A survey of tobacco warehouse operators found a relatively consistent pattern of purchase shares made by tobacco buyers across the markets of the region. This information, coupled with government cross-border tobacco trade flow information, and a survey of the regional stemming and redrying operators, leads to an estimate that 12 to 15 percent of the tobacco input used by Southside tobacco stemming and redrying processors comes

from Southside tobacco production. This input use represents approximately 50 to 60 percent of Southside tobacco production. An unrelated finding compiles information taken from specially prepared government reports to estimate absentee marketing quota ownership. The conclusion is that approximately 11.3 percent of marketing quota owners reside outside the *study region*. Lastly, employment information, or contribution in jobs, is gathered for the tobacco warehouses and the stemming and redrying operations. Obtaining all of this information accomplishes the second part of the descriptive analysis objective, to incorporate superior regional information into the base IMPLAN model.

In general, the base IMPLAN model is a reasonable model: most of the regional information contained in its database examined by the study is found to be reasonably accurate. One exception is the production function to the tobacco sector. This study changes the production function to reflect regional flue-cured production, rather than an average of differing national production functions for several types of tobacco. Accurate base model data is not sufficient to ensure accurate projections using the tool. Thus, Chapter V reviews the theory of input-output analysis, techniques specific to IMPLAN, and the literature applicable to this study. All of these findings coalesce into the design of the model scenarios used to meet the remaining study objectives.

The measurement of tobacco's contribution across sectors is one scenario result found in Chapter VI. This analysis bolsters previous descriptive analysis work. One other study objective, to forecast the extent of the leakage of tobacco's economic contribution from the *study region* due to absentee quota owners, is also found in the work leading up to the final contribution result. Yet another study objective seeks to determine leakages when *study region* tobacco product is processed by stemming and redrying operators outside the *study region*. Under the current supply-controlled environment, these leakages are not reduced by import substitution, or an increase in the regional supply proportion. An improvement in regional economic contribution can only result if the regional stemming

and redrying operators increase their market share. One scenario is designed to measure such an adjustment.

The last study objective is to forecast the proportional change in employment, income, and output across sectors for scenarios reflecting different potential causes for a decline in tobacco production. One scenario most closely meets this objective. It reflects adjustment to reduce the production of flue-cured tobacco, while maintaining the market price, a situation possible under the current tobacco program. However, a second scenario is run that isolates the impact of a decrease in market price without a decrease in production levels. A severe adjustment in the industry may see significant decreases in both production levels and price as seen separately by these two scenarios. One last scenario is run to provide information not required by the objectives of the study. Rather than a decrease in production in tobacco, a large increase is matched by a decrease in market price, using estimates made by a team of industry observers in the event the tobacco program is discontinued.

VII.2 Conclusions

Most of the study conclusions are an adaptation of the most basic study result: an estimate of the regional economic contribution of flue-cured tobacco-related industries to the Southside *study region.* Tobacco producers provide one of the direct economic impacts. Census data indicates that, in 1992, the region had 2141 tobacco farms, with 1640 of these having over $10,000 in tobacco sales. In 1995, regional farms produced nearly 51 million pounds of flue-cured tobacco with a value of approximately $92 million using the season's average sale price. Two stemming and redrying processors in the *study region* provide another direct economic impact. Survey results indicate that these 2 factories provide 1152 jobs for an average of 39 weeks a year per job. For the 1995 season these factories processed 200 million pounds of tobacco, estimated to generate approximately $635 million in output.

A significant indirect economic impact in the region is tobacco warehouses where tobacco is sold by auction. The half of the study region warehouses responding to the survey indicated that they provide 159 jobs for an average of 16 weeks per job. Extrapolating this result based on sales, 340 regional jobs are generated by this service. The estimated regional warehouse payroll based upon a five dollar per hour wage rate is over one million dollars. Finally, Southside warehouses had gross tobacco sales of nearly $177 million in 1995, earning an estimated commission of over $4 million. Another indirect impact is a service hired to bundle and load tobacco sold at warehouses. Using a rate provided by an industry observer, this service generated fees of over three million dollars in 1995.

All other economic impact information was estimated using IMPLAN. These results are for 1995 tobacco-related industry production, valued in 1992 dollars. Total regional output created by tobacco-related industries, including the 'ripple effect' it encourages, is $756 million. The value added portion of the output is nearly $251 million, associated with over 6800 jobs. Many of these jobs are only seasonal in nature. All of these figures can be stated in terms of the regional economy as a whole, generating nearly 11 percent of total industry output, over seven percent of value added, and more than six percent of all jobs. Clearly the industry is a significant component of the regional economy. The ripple effect is found to be spread over a wide range of the *study region* economy, meaning nearly every business in the region generates some of its commerce either directly or indirectly from the tobacco trade.

In generating the estimates of regional economic impact, a significant finding is that the economic losses from the region due to the existence of absentee quota owners is relatively inconsequential. Due to absentee quota ownership, industry output falls by $1.17 million, total value added decreases by $0.74 million and approximately 24 jobs

are lost. All of these measures are less that one half of one percent of their respective total regional contribution from the tobacco-related industries.

The four scenarios reflecting different adjustments to the tobacco industry provide interesting results. The scenario reflecting a ten percent decrease in tobacco production, or decrease in the marketing quota, causes a ten percent decrease in the contribution of all of the measures. On the other hand, a scenario showing the impact of only the stemming and redrying industry indicates it is the leading contributor in the previous output and value added results for the quota adjustment. Another scenario analyzing a ten percent drop in the price of tobacco without a decrease in production levels indicates that this has a relatively less significant effect on the economy as a whole, as all contribution measures decrease by less than two percent. It follows, then, that the speculative scenario simulating an end to the tobacco program, utilizing a 23 percent decrease in the price of tobacco and a 50 percent increase in production (based on predictions by Sumner and Alston; 1985), leads to large gains in the regional economic contribution measures. Particular caution must be exercised in interpreting this result due to the assumptions made in its estimation and other existing limitations of the model. Perhaps the best interpretation of these results is the importance of maintaining existing regional levels of tobacco production and tobacco stemming and redrying processing.

In assessing these impacts, a number of socioeconomic groups account for a large part of the adjustment, with the level of adjustment varying with each impact being measured. First are the tobacco producers, mostly rural-dwelling households located throughout the region. Labor hired by the tobacco producers is a second group that, more often than not, is hired from areas outside the region. Another social group impacted is tobacco stemming and redrying factory workers, mostly African-Americans residing in proximity to Danville. A last group that will be impacted by adjustments is largely undefined, but is

expected to include at least some retired tobacco producers. This group consists of the tobacco quota owners that reside in the region, but who do not produce tobacco.

VII.3 Study Caveats and Recommendations

Consideration of study caveats should begin with a reminder of the assumptions and limitations of input-output analysis. Not all of these will be reviewed here, but their implications must be considered when evaluating the results. For example, the scenario evaluating a discontinuation of the tobacco program ignores capacity constraints that will lead to crop substitution and labor offsets. If projections of this kind are desired, more sophisticated input-output scenarios can accommodate some of these limitations.

A strong limitation in input-output studies of this kind is the difficulty is assessing the distributional aspects of the impacts. While it may be easy to say that a decrease in tobacco price has a relatively small impact on the regional economy, it says nothing about the large impact it may have on tobacco producers or quota owners. Possibilities for further research on these and other distributional aspects is broad.

This study is also limited in the extent it identifies the impact of tobacco-related industries on the retail sectors. The study scenarios identify the relevant producing sectors and use producer prices for the inputs in their production functions and expenditure patterns. In cases such as the farm machinery and equipment sector, the associated retail impacts may not be fully accounted for. The current IMPLAN database does not have industry margin tables that could allow alternative techniques to capture this form of impact. Similarly, the existing household margin table does not have margins for the farm machinery and equipment sector that could be used as a proxy. Other studies could attempt to estimate these margins.

Finally, numerous assumptions are made throughout the study. In some cases additional data could be collected, time and funds permitting, that would reduce the level of assumptions made. Thus, care must be taken in understanding study assumptions and any limitations to the study findings that they present.

References

Alward, G. S. and B. J. Sullivan. "Estimated Impacts of Increased Federal Grazing Fees on Income and Employment in 13 Western States." Appendix to the 1985 USFS/BLM Grazing Fee Study, October 1984.

Babcock, Bruce A. and William E. Foster. "Economic Rents Under Supply Controls with Marketable Quota". *American Journal of Agricultural Economics*. 74(1992):630-631.

Bickers, Christopher. "Import Fairness - American Style". *Tobacco International*. January, 1996:28-31.

Broomhall, David, and Thomas G. Johnson. "Regional Impacts of the Conservation Reserve Program in the Southeast with Conversion to Trees: An Application of Input-Output Analysis." *The Review of Regional Studies*. 20(1991):76-85.

Center for Public Service. *Virginia Statistical Abstract*, 1994-95 Edition. Charlottesville: Center for Public Service, University of Virginia, 1994.

Clauson, Annette L. and Verner N. Grise. *Flue-cured Tobacco Farming: Two Decades of Change*. Washington, DC: Commodity Economics Division, Economic Research Service, U.S. Department of Agriculture, Agricultural Economic Report No. 692,1994.

Consolidated Farm Service Agency. Internal documents.

Conway, Richard S., Jr. "An Empirical Comparison of Regional Multipliers". *Regional Input-Output Modelling: New Developments and Interpretations*. John H.Ll. Dewhurst, Geoffrey J.D. Hewings and Rodney C. Jensen, editors, pp. 178-195. Aldershot: Avebury, 1991.

Danville Tobacco Association, Incorporated. *100 Years of Progress: 1869-1969*. Danville, VA, 1969.

DeVilbiss, John M. *Economic Diversity and Dependency Assessment*. A Technical Report Used in Amending the Rocky Mountain Regional Guide. Denver, CO: United States Department of Agriculture, Forest Service, Rocky Mountain Region, April 1992.

Dibrell Brothers, Incorporated. *Form 10-K for fiscal year ended June 30, 1994*.

DIMON, Inc. *1995 Annual Report.*

Duke, Maurice and Daniel P. Jordan. *Tobacco Merchant: The Story of Universal Leaf Tobacco Company.* Lexington: The University Press of Kentucky, 1995.

Economic Impact Assessment IMPLAN Analysis Guide. Unpublished Draft.

Ecosystem Management Staff. *Constructing Regional Social Accounts: An Annotated Guide to IMPLAN.* Fort Collins, CO: USDA, Forest Service, 1994.

_____ "Impact Areas." *Supplemental Readings on Input-Output and Micro Implan.* Fort Collins, CO: USDA, Forest Service, 1992.

Fox, Karl A. "The BEA Economic Areas." *Urban-Regional Economics, Social System Accounts, and Eco-Behavioral Science: Selected Writings by Karl A. Fox.* J. Prescott, P. van Moeseke, and J. Sengupta, editors, pp. 109-117. Ames: Iowa State University Press, 1994a.

_____ "Strategies for Area Delimitation in a National System of Regional Accounts." *Urban-Regional Economics, Social System Accounts, and Eco-Behavioral Science: Selected Writings by Karl A. Fox.* J. Prescott, P. van Moeseke, and J. Sengupta, editors, pp. 70-94. Ames: Iowa State University Press, 1994b.

Gale, Fred. *What Tobacco Farming Means to Local Economies.* Washington DC: USDA ERS Agricultural Economic Report No. 694, September 1994.

Gaulin, Jacqueline. "Dibrell to Process Lorillard Tobacco." *The Washington Times*, 11 March, 1995, p. D8.

Giarratani, Frank and Robert E. Garhart. "Simulation Techniques in the Evaluation of Regional Input-Output Models: A Survey." *Regional Input-Output Modelling: New Developments and Interpretations.* John H.Ll. Dewhurst, Geoffrey J.D. Hewings and Rodney C. Jensen, editors, pp. 14-50. Aldershot: Avebury, 1991.

Glaze, Dargan. "Costs of Producing and Selling Flue-Cured Tobacco: 1993, 1994 and Preliminary 1995." *Tobacco Situation and Outlook Report.* Washington DC: USDA ERS, TBS-232, September, 1995.

Gray, Tim. "Monk-Austin, Competitor to Merge." *The News & Observer* (Raleigh, NC), 25 October, 1994, p. D1.

Greensboro News & Record. "Tobacco Leaf Sellers OK Merger Plans Dibrell and Monk-Austin." 1 April, 1995, p. B5.

Grise, Verner N. *Government Support for the U.S. Tobacco Industry.* Washington DC: U.S. Department of Agriculture, Economic Research Service, Agriculture Information Bulletin no. 664-38, May, 1993.

_____ *Tobacco: Background for 1995 Farm Legislation.* Washington DC: U.S. Department of Agriculture, Commercial Agriculture Division, Economic Research Service, Agricultural Economic Report No. 709, 1995.

Grossman, Michael, Jody L. Sindelar, John Mullahy, and Richard Anderson. "Policy Watch, Alcohol and Cigarette Taxes." *Journal of Economic Perspectives.* 7(1993): 211-222.

Harris, Gary. Employee, Flue-cured Tobacco Cooperative Stabilization Corporation, telephone interview, 20 November, 1995.

Hastings, Steven E. and Sharon M. Brucker. "An Introduction to Regional Input-Output Analysis." *Microcomputer-Based Input-Output Modeling, Applications to Economic Development.* Daniel M. Otto and Thomas G. Johnson, editors, pp. 1-27. Boulder: Westview Press, 1993.

Henry, Mark S. and Thomas G. Johnson. "Cautions in Using I-O Models." *Microcomputer-Based Input-Output Modeling: Applications to Economic Development.* Daniel M. Otto and Thomas G. Johnson, editors, pp. 28-46. Boulder: Westview Press, 1993.

Hoover, Edgar M. *An Introduction to Regional Economics*, Second Edition. New York: Alfred A. Knopf, Inc., 1975.

IMPLAN Development and Applications Group. *IMPLAN Companion Guide.* St. Paul, MN: Department of Agricultural Economics, University of Minnesota, undated.

International Trade Publications Ltd. *World Tobacco Directory*, 43rd edition 1995. Redhill: Argus Business Publications Ltd, 1995.

Isard, Walter. *Introduction to Regional Science.* Englewood Cliffs: Prentice-Hall, Inc., 1975.

_____ "Regional Science, the Concept of Region, and Regional Structure." *Papers and Proceedings of the Regional Science Association*, 2(1956):13-26.

John, Glenn A. "United States Cigarettes: Battered, Bruised, But Far From Broken". *Tobacco International*. February 1995: 30-32.

Johnson, Thomas G. and Ernie W. Wade. *The Economic Impact of Agriculture in Virginia.* Virginia Cooperative Extension publication 448-217 / REAP R019, Virginia Polytechnic Institute and State University, 1994.

Johnson, Thomas G., Ernest W. Wade and Russell Archambault. *An Economic Opportunities Analysis for the New River Valley*. March, 1994.

Jones, Chip. "B.A.T. Buyout Leaves 500 Uncertain of Jobs." *Richmond Times-Dispatch*, 24 December, 1994, p. A1.

_____ "The Last Days of American Tobacco: A Company With Deep Local Roots Prepares to Shut Down." *Richmond Times-Dispatch*, 20 February, 1995, p. D18.

_____ "Philip Morris Promotion Puts David Milby in Charge." *Richmond Times-Dispatch*, 25 April, 1995, p. C1.

Jones, Lonnie L. and Allen Wyse. *Regional Economic Impacts of the Loss of the Wool Act In Dependent Regions of Texas.* Department of Agricultural Economics, Texas Agricultural Experiment Station, Texas A&M University System, 1995.

Knapp, John L., et al. *Southside Target Industry Study*. Charlottesville: Center for Public Service, University of Virginia, Business and Economics Section, September 1989.

Lambert, Wade and Milo Geyelin. "FDA Planned Tobacco-Ad Rules Spur Suits Over Agency's Powers." *Wall Street Journal*, August 14, 1995, sec. B, p. 6.

Lindall, Scott. "Part A - 1992 Data Base Discussion." *IMPLAN News*. February 1995, p. 2.

_____ "IMPLAN Data Issues." *IMPLAN News*. May 1996, pp. 4-5.

Lindall, Scott and Doug Olson. *Micro IMPLAN 1990/1985 Database Documentation.* Minnesota Implan Group, 1993.

_____ *The IMPLAN Input-Output System.* Stillwater MN: MIG, Inc., undated.

Maki, Wilbur, Richard Lichty, and Scott Loveridge. "Reducing System Bias and Specification Error in Micro-IMPLAN." *Staff Paper Series.* Department of Agricultural and Applied Economics, University of Minnesota, P94-12, June 1994.

Mann, Charles Kellogg. *Tobacco: The Ants and the Elephants.* Salt Lake City: Olympus Publishing Company, 1975.

Marshall, J. P. Professor, Agricultural and Applied Economics, Virginia Polytechnic Institute and State University, personal interview, 7 June, 1995.

Martin, Michael, Hans Radtke, Bart Eleveld, and S. Dianne Nofziger. "The Impacts of the Conservation Reserve Program on Rural Communities: The Case of Three Oregon Counties." *Western Journal of Agricultural Economics.* 13(1988):225-232.

MIG, Inc. *MIG Technical Analysis Guide: A Guide to Analysis Using the MIG DOS Based IMPLAN Input-Output System.* Stillwater MN: MIG Inc., 1996.

Miller, Ronald E. and Peter D. Blair. *Input-Output Analysis: Foundations and Extensions.* Englewood Cliffs, NJ: Prentice-Hall, Inc., 1985.

Monk-Austin, Inc. *Form 10-K for fiscal year ended June 30, 1994.*

_____ *Form 10-K/A for fiscal year ended June 30, 1994.*

Neergaard, Lauran. "Plant Squeezes Tobacco Waste into Smokes." *Roanoke Times*, 27 March, 1996, p. A1.

North Carolina Agricultural Statistics Division. Internet Worldwide Web Page: http://www.agr.state.nc.us/stats/. Raleigh: North Carolina Department of Agriculture, March 1995.

North, Douglass C. "Location Theory and Regional Economic Growth." *Journal of Political Economy.* 63(1955):243-258.

_____ "A Reply." *Journal of Political Economy.* 64(1956):165-168.

Park, Joon-Kyu. *An Economic Profile of the West Piedmont Planning District.* Charlottesville: Center for Public Service, University of Virginia, 1993.

Pelay, Carlos E. *An Economic Profile of the Southside Planning District.* Charlottesville: Center for Public Service, University of Virginia, 1993.

Polenske Karen R. and Stephen F. Fournier. "INTRO-IO: Introduction to Input-Output Accounting and Modeling". *Spreadsheet Models for Urban and Regional Analysis.* R. Klosterman, R. K. Brail and E. G. Bossard, editors, pp. 205-227. New Brunswick, NJ: Rutgers, the State University of New Jersey, 1993.

Powell, Roy. "Impact Component Analysis: Making More Use of What We Have". *Regional Input-Output Modelling: New Developments and Interpretations.* John H.Ll. Dewhurst, Geoffrey J.D. Hewings and Rodney C. Jensen, editors, pp. 159-177. Aldershot: Avebury, 1991.

Prescott, James R. "Introduction." *Urban-Regional Economics, Social System Accounts, and Eco-Behavioral Science: Selected Writings by Karl A. Fox.* J. Prescott, P. van Moeseke, and J. Sengupta, editors, pp. 2-4. Ames: Iowa State University Press, 1994.

Price Waterhouse. "The Economic Impact of the Tobacco Industry on the United States Economy". Report prepared for the Tobacco Institute, 1990.

Purcell, Wayne D. "The Virginia Tobacco Industry in a World of Change." Rural Economic Analysis Program, Special Report, Virginia Tech, 1994.

Rand McNally. *1996 Commercial Atlas and Marketing Guide*, 127th edition. Chicago: Rand McNally & Company, 1996.

_____ *Rand McNally Trading Area Manual, A Supplement to the Ranally Trading Area Map of the United States.* Chicago: Rand McNally & Company, 1973.

Reed T. David, James L. Jones, Charles S. Johnson, Paul J. Semtner, B. Blake Ross and Carol A. Wilkinson. *1995 Flue-cured Tobacco Production Guide.* Virginia Cooperative Extension, November, 1994.

Ress, David and Bob Piazza. "Industry Fears FDA 'Agenda'." *Richmond Times-Dispatch*, 11 August, 1995, p. A1.

Richardson, Harry W. *Input-Output and Regional Economics.* New York: John Wiley & Sons Inc., 1972.

_____ "Input-Output and Economic Base Multipliers: Looking Backward and Forward." *Journal of Regional Science*. 25(1985):607-653.

Roberts, Deborah. "A Modified Leontief Model for Analysing the Impact of Milk Quotas on the Wider Economy." *Journal of Agricultural Economics*. 45(1994):90-101.

Sheppard, Eric and Trevor J. Barnes. *The Capitalist Space Economy: Geographical Analysis after Ricardo, Marx and Sraffa.* London: Unwin Hyman Ltd., 1990.

Siegel, Frederick F. *The Roots of Southern Distinctiveness: Tobacco and Society in Danville, Virginia, 1780-1865.* Chapel Hill: University of North Carolina Press, 1987.

Siegel, Paul B., Thomas G. Johnson and Jeffrey Alwang. "Regional Economic Diversity and Diversification". *Growth and Change*. 26(1995): 261-284.

Sills, Erin O., Jeffrey Alwang and Paul Driscoll. "Migrant Farm Workers on Virginia's Eastern Shore: An Analysis of Economic Impacts." *Journal of Agricultural and Applied Economics*. 26(1994):209-223.

Siverts, L. Eric. "Chapter 2 - Analysis Framework". In *Economic Impact Assessment IMPLAN Analysis Guide.* Unpublished draft version, February 23, 1994.

Siverts, L. Eric, Gregory S. Alward and Wilbur R. Maki. *Agricultural Policy Evaluations Using IMPLAN.* Department of Agricultural and Applied Economics Staff Paper Series P90-65, University of Minnesota, November 1990.

Siverts, L. Eric and John W. Green. "Chapter 5 - Current Activity Analysis". In *Economic Impact Assessment IMPLAN Analysis Guide*. Unpublished draft version, February 23, 1994.

Solomon, Scott. "Dibrell Takes Command of Lorillard Unit Tobacco." *Greensboro News and Record*, 11 March, 1995, p. B6.

Southside Study Committee. *A Report on the Economic Potential of Six Southside Virginia Counties*. Southside Study Committee of the Advisory Council on the Virginia Economy, April 1960.

Southside Virginia Industrial Development and Economic Planning Council. *Southside Virginia Economic Data*, April 1955.

Standard Commercial Corporation. *Form 10-K for fiscal year ended March 31, 1995.*

Stevens, Benjamin H. and Glynnis A. Trainer. "Error Generation in Regional Input-Output Analysis and its Implications for Nonsurvey Models." *Economic Impact Analysis: Methodology and Applications*. Saul Pleeter, ed., pp. 68-84. Boston: Martinus Nijhoff Publishing, 1980.

Stevens, Benjamin H., George I. Treyz and Michael L. Lahr. "On the Comparative Accuracy of RPC Estimating Techniques." *Frontiers of Input-Output Analysis.* Ronald E. Miller, Karen R. Polenske and Adam Z. Rose, editors, pp. 245-257. New York: Oxford University Press, 1989.

Sumner, Daniel A., and Julian M. Alston. *Removal of Price Supports and Supply Controls for U.S. Tobacco: An Economic Analysis of the Impact.* Washington DC: Food and Agriculture Committee, National Planning Association, NPA Report no. 220, 1985.

Sureshwaran, S. "Impacts on Alternative Sectors of the South Carolina Economy of the Flue-cured Tobacco Price Support Program." Ph.D. Dissertation, Clemson University, 1989.

Tarczy, Robert L. *Some Short-Term and Long-Term Implications of the Tobacco Buyout Program.* Unpublished paper for 36th Tobacco Workers' Conference, Tampa, Florida, January 9-12, 1995.

Taylor, Carol, Susan Winter, Greg Alward, and Eric Siverts. *Micro IMPLAN User's Guide: Version 91-F.* Fort Collins, CO: USDA Forest Service, Land Management Systems Group, January, 1992. Modified by: Doug Olson, Scott Lindall and Wilbur Maki. St. Paul, MN: Minnesota IMPLAN Group, January 1993.

Thornsbury, Suzanne, S. Murthy Kambhampaty and David Kenyon. "Economic Impact of a Swine Complex in Southside Virginia." Rural Economic Analysis Program, Publication 448-215/REAP R017, Virginia Tech, 1993.

Tiebout, Charles M. "Exports and Regional Economic Growth." *Journal of Political Economy.* 64(1956):160-164.

Treyz, George I. "Policy Simulation Modeling." *Microcomputer-Based Input-Output Modeling, Applications to Economic Development.* Daniel M. Otto and Thomas G. Johnson, editors, pp. 172-180. Boulder: Westview Press, 1993.

Universal Corporation. *Form 10-K for fiscal year ended June 30, 1995.*

U.S. Bureau of the Census. *1990 Census of Population and Housing*, Population and Housing Unit Counts, North Carolina. Washington, DC: U.S. Government Printing Office, 1992.

_____ *1992 Census of Agriculture*, Volume 1 Geographic Area Series, Part 46, Virginia State and County Data. Washington, DC: U.S. Government Printing Office, 1994.

_____ *1992 Census of Manufactures*, Industry Series, Tobacco Products. Washington, DC: U.S. Government Printing Office, January 1995.

_____ *County and City Data Book: 1994*. Washington, DC: U.S. Government Printing Office, 1994.

U.S. Department of Agriculture, Commodity Economics Division, Economic Research Service. *Tobacco Situation and Outlook Report*. Washington DC: USDA ERS. Various issues.

U.S. Department of Commerce. Bureau of Economic Analysis. *BEA Regional Projections to 2040, Vol. 3: BEA Economic Areas*. Washington, DC: U.S. Government Printing Office, October 1990.

Virginia Agricultural Statistics. *1993 Annual Bulletin*. Richmond: Virginia Agricultural Statistics Service, September 1994.

_____ *1994 Annual Bulletin*. Richmond: Virginia Agricultural Statistics Service, September 1995.

Virginia Chamber of Commerce. *1995 Virginia Industrial Directory*. Twinsburg, OH: Harris Publishing Co., 1995.

Virginia Employment Commission. Internet Worldwide Web Page: http://www.state.va.us/vec/lmi.html. Richmond: Virginia Employment Commission, 1996.

Waggoner, Martha and Associated Press. "Two Major Tobacco Merchants to Merge - Monk-Austin, Dibrell Plan Stock-swap Deal." *The Boston Globe*, 24 October, p. 20.

Wagner, Deller and Alward. "Estimating Economic Impacts Using Industry and Household Expenditures". *Journal of the Community Development Society*. 23(1992):79-102.

Womach, Jasper. "Increasing Cigarette Excise Taxes: Implications for Tobacco Farming". *CRS Report for Congress.* April 20, 1994.

Yonkin, Pamela C. *An Economic Profile of the Piedmont Planning District.* Charlottesville: Center for Public Service, University of Virginia, 1993a.

_____ *An Economic Profile of the Central Virginia Planning District.* Charlottesville: Center for Public Service, University of Virginia, 1993b.

Appendix 1.1 CFSA Tobacco Quota Report - Example Page

05/15/96 08.17.30 PAGE 34

Farm Number	Tract Number	Basic Quota	Eff Qta	Contrb Percent	City Name	St Abbr
4717	5402	3,818	3,729	1.0000	BUFFALO JCT	VA
4732	33	5,472	5,338	.3405	BRACEY	VA
	464	5,472	5,338	.6587	LA CROSSE	VA
	1220	5,472	5,338	.0008	LA CROSSE	VA
	1220	5,472	5,338	.0008	LA CROSSE	VA
4733	4839	74,224	71,908	.0506	CLARKSVILLE	VA
	4888	74,224	71,908	.0552	CLARKSVILLE	VA
	4888	74,224	71,908	.0552	CLARKSVILLE	VA
	4925	74,224	71,908	.0675	CLARKSVILLE	VA
	5098	74,224	71,908	.0286	CLARKSVILLE	VA
	5407	74,224	71,908	.0668	CLARKSVILLE	VA
	5415	74,224	71,908	.6053	CLARKSVILLE	VA
	5415	74,224	71,908	.6053	CLARKSVILLE	VA
	5434	74,224	71,908	.0732	CLARKSVILLE	VA
	5666	74,224	71,908	.0528	NELSON	VA
	5666	74,224	71,908	.0528	NELSON	VA
	5666	74,224	71,908	.0528	BUFFALO JUNCTION	VA
4737	2208	8,565	8,297	1.0000	COLONIAL HEIGHTS	VA
4741	3260	10,724	10,398	.2585	CLARKSVILLE	VA
	3417	10,724	10,398	.2331	ARLINGTON	VA
	4635	10,724	10,398	.3135	SKIPWITH	VA
	4733	10,724	10,398	.1949	PHILADELPHIA	PA
4744	411	2,522	2,443	1.0000	LA CROSSE	VA
4745	408	6,360	6,360	.1481	LA CROSSE	VA
	669	6,360	6,360	.7621	TEANECK	NJ
	669	6,360	6,360	.7621	LA CROSSE	VA
	690	6,360	6,360	.0898	TEANECK	NJ
4754	4219	49,702	48,158	.1629	CLOVER	VA
	4220	49,702	48,158	.0531	CLOVER	VA
	4484	49,702	48,158	.0329	FARMVILLE	VA
	4493	49,702	48,158	.0891	FARMVILLE	VA
	4506	49,702	48,158	.0129	SKIPWITH	VA
	4633	49,702	48,158	.3860	SKIPWITH	VA
	4633	49,702	48,158	.3860	SKIPWITH	VA
	4656	49,702	48,158	.1597	HARRISONBURG	VA
	4842	49,702	48,158	.0594	CHASE CITY	VA
	4842	49,702	48,158	.0594	EGG HARBOR CITY	NJ
	4842	49,702	48,158	.0594	SKIPWITH	VA
	4842	49,702	48,158	.0594	SKIPWITH	VA
	4842	49,702	48,158	.0594	OCEAN CITY	NJ
	4842	49,702	48,158	.0594	SKIPWITH	VA
	4917	49,702	48,158	.0440	CLARKSVILLE	VA

Appendix 1.2 Quota Report Calculations - Input Example Page

Farm	Shares per Tract	Basic Quota	Mult.	Contrb.	Absentee Share	Out-State Share	Absentee Calc.	Out-State Calc.
4717	1	3818	3818	1	0		0	0
4732	1	5472	5472	0.3405	0		0	0
4732	1	0	5472	0.6587	0		0	0
4732	2	0	5472	0.0008	0		0	0
4733	1	74224	74224	0.0506	0		0	0
4733	2	0	74224	0.0552	0		0	0
4733	1	0	74224	0.0675	0		0	0
4733	1	0	74224	0.0286	0		0	0
4733	1	0	74224	0.0668	0		0	0
4733	2	0	74224	0.6053	0		0	0
4733	1	0	74224	0.0732	0		0	0
4733	3	0	74224	0.0528	0		0	0
4737	1	8565	8565	1	1		8565.000	0
4741	1	10724	10724	0.2585	0		0	0
4741	1	0	10724	0.2331	1		2499.764	0
4741	1	0	10724	0.3135	0		0	0
4741	1	0	10724	0.1949	1	1	2090.108	2090.108
4744	1	2522	2522	1	0		0	0
4745	1	6360	6360	0.1481	0		0	0
4745	2	0	6360	0.7621	1	1	2423.478	2423.478
4745	1	0	6360	0.0898	1	1	571.128	571.128
4754	1	49702	49702	0.1629	0		0	0
4754	1	0	49702	0.0531	0		0	0
4754	1	0	49702	0.0329	1		1635.196	0
4754	1	0	49702	0.0891	1		4428.448	0
4754	1	0	49702	0.0129	0		0	0
4754	2	0	49702	0.3860	0		0	0
4754	1	0	49702	0.1597	1		7937.409	0
4754	6	0	49702	0.0594	2	2	984.100	984.100
4754	1	0	49702	0.0440	0		0	0
	42	161387		8	10	5	31134.631	6068.813

Appendix 1.3 Explanation of Absentee Quota Ownership Calculations

A listing of town names associated with zip codes in the Southside study region is necessary for interpretation of 'absentee'. The following steps are performed in preparing this address listing:

1. A zip code map is consulted to find all of the five-digit zip codes in the six-county Southside area.

2. In order to identify the town name associated with each zip code an address listing on the internet is used. This is a Telnet address: nebula.lib.vt.edu port 10072.

3. A report is created that is sorted by town name.

Critical data from each CFSA report is re-entered into a spreadsheet. At the same time the data is evaluated and different columns of information are prepared. The following steps are performed:

1. Each column of the report is prepared as follows, with assumptions indicated:

- "Farm" - Column A - Farm Number on the original report. This is input each time there is a different tract number listed under the farm.

- "Shares per Tract" - Column B - This is a count of the number of times a tract is listed on the original report under a farm.

- "Basic Quota" - Column C - This is the Basic Quota for a farm on the original report. It is listed only on the first line for a farm.

- "Mult." - Column D - This column is used for calculations only. It is the basic quota for a farm repeated for every line of that farm.

- "Contrb." - Column E - This is the Contribution Percent on the original report. This number is unique to each tract under a farm.

- "Absentee Share" - Column F - For each tract this is the number of towns not listed on the listing of towns in the Southside region prepared from a zip code map.

- "Out-State Share" - Column G - Same concept as above, except only those states (or Washington DC) other than Virginia are counted.

- "Absentee Calc." - Column H - Provides the amount of absentee quota in pounds, calculated by: (Column F / Column B) * Column D * Column E

- "Out-State Calc." - Provides the amount of out-of-state absentee quota in pounds, calculated by: (Column G / Column B) * Column D * Column E

Note: There is an important assumption made in the two calculations above. The actual ownership breakdown for every share on a tract in not known. The calculations above assume an equal ownership share for each tract. This will not be correct in every case, but hopefully will be materially accurate on average.

2. As each page is entered, subtotals are calculated. The "Contrb." column should always total to an even number. It represents the number of farms for that page. Other sub-totals are reviewed for reasonableness.

3. Grand totals for each county are prepared on relevant columns of information. The grand total basic quota for each county is reconciled with totals provided by the county CFSA office.

4. Percentages are calculated using the grand totals from each county's report.

Appendix 2 Southside Tobacco Warehouse Survey

ID No. _____ Date: _____

For the person completing this form, please indicate your position (owner, manager, accountant, etc.): _____

1. Please provide the breakdown of tobacco, by type, sold at your warehouse in **1995**:

Tobacco Type:	**Percentage of Sales (%)**
Flue-cured ---	
Fire-cured ---	
Other: _____	
Total	100 %

2. For the **flue-cured** tobacco sold at your warehouse in **1995**, please indicate the percentage that was grown in Southside Virginia. For the purposes of this survey, Southside Virginia is identified as Brunswick, Charlotte, Halifax, Lunenburg, Mecklenburg, and Pittsylvania counties.

Where Tobacco is Grown:	**Percentage of Sales (%)**
Southside Virginia (six-county region)	
Outside Southside Virginia	**(a)**
Total	100 %

(a) If some percentage of the tobacco sold at your warehouse was grown outside of the Southside region, is any of that amount grown outside of Virginia? Check one:

____ Yes ==> If yes, what percentage of your total sales? _____%

____ No (All tobacco sold at the warehouse is grown in Virginia).

3. Are the 1995 percentages given in question 2 consistent with the previous three years (1992-1994)? Check one:

____ Yes

____ No ==> If no, please describe the change over the past three years:

_____

_____

_____

4. Please fill in the following table relating to the purchase of **flue-cured** tobacco at your warehouse in **1995**:

(Please note that this information will remain confidential: a buyer's name will never be associated with the numbers provided.)

Purchaser:	**Percentage of Sales (%)**	**Total Pounds**	**Total Purchases in Dollars**
Dibrell Brothers			
Monk-Austin			
Eastern Processors			
Export Leaf Tobacco			
Standard Commercial			
J.P. Taylor			
Thorpe-Granville			
Stabilization (Co-op)			
* _____			
* _____			
* _____			
Total	100 %	lbs.	$

* The purchaser names are provided for your convenience. Extra spaces are provided for you to write the names of other purchasers and indicate their statistics.

5. Other than changes in the share going to stabilization, are the relative proportions purchased by buyers in question 4 consistent with the previous three years (1992-1994)? Check one:

____ Yes

____ No ==> If no, please describe the change over the past three years:

_____

_____

_____

6. Please estimate the percentage of tobacco sold at your warehouse in **1995** that remained in the Southside region for further processing (stemming and redrying):

Processing Location:	**Percentage of Sales (%)**
Southside Virginia (six-county region)*	
Outside Southside Virginia	
Total	100 %

* Recall that for purposes of this survey, the six-county region includes Brunswick, Charlotte, Halifax, Lunenburg, Mecklenburg, and Pittsylvania counties.

7. Are the 1995 percentages given in question 6 consistent with the previous three years (1992-1994)? Check one:

____ Yes

____ No ==> If no, please describe the change over the past three years:

_____

_____

_____

8. Please fill in the following table regarding the number of people **you** employed at your warehouse in **1995**:

Job Type: *	**Number Employed**	**Average Hours per Week**	**Number of Weeks**
_____			
_____			
_____			
_____			
_____			
_____			
Total			

* Please categorize jobs. Categories should only include positions at similar wage rate levels. Provide a job description that best describes each category. Example 'Job Types' include: Management, Clerical (book-keeper, secretary, etc.), Laborers (unloaders, scale operators, maintenance, etc.).

Two examples follow:

Job Type: *	**Number Employed**	**Average Hours per Week**	**Number of Weeks**
Management	1	40	52
Laborers	2	30	16

In the example above there is one manager who is a full-time employee for the entire year. Thirty hours per week on average is shown for the two laborers. In this case one laborer works 40 hour weeks and the other laborer works 20 hour weeks. Both jobs are seasonal; they work only 16 weeks a year.

Thank you! If you have additional comments, please write them in the space below.

Appendix 3 Southside Stemming and Redrying Operator Survey

Date: _____

For the person completing this form, please indicate your job title: _____

1. Please provide the breakdown between flue-cured tobacco and all other types processed at your plant in **1995**:

Tobacco Type:	**Pounds Processed**	**Percentage of Processing (%)**
Flue-cured		
All Other		
Total		100 %

2. Are the 1995 percentages given in question 1 consistent with the previous three years (1992-1994)? Check one:

   ____ Yes

   ____ No ==> If no, please describe the change over the past three years:

   _____

   _____

   _____

3. For the **flue-cured** tobacco processed at your plant in **1995**, please indicate the pounds and percentage that were purchased at markets in Southside Virginia and elsewhere. For the purposes of this survey, Southside Virginia contains the following markets: Chase City, Clarksville, Danville, Kenbridge, Lawrenceville, South Boston and South Hill, Virginia.

Where Flue-cured is Purchased:	**Pounds**	**Percentage of Purchases (%)**
Southside Virginia markets		
Other markets		
Total Flue-cured		100 %

4. Are the 1995 percentages given in question 3 consistent with the previous three years (1992-1994)? Check one:

____ Yes

____ No ==> If no, please describe the change over the past three years:

_____

_____

_____

5. Please fill in the following table regarding the number of people you employed in **the Southside Virginia region** in **1995**: Note that there are two divisions: Stemming and Redrying Operations, and Other Tobacco Operations. For the purposes of this question, Southside Virginia is defined as the area comprising the counties of Brunswick, Charlotte, Halifax, Lunenburg, Mecklenburg and Pittsylvania.

Job Category:	**Number Employed**	**Average Hours per Week**	**Number of Weeks**
Stemming and Redrying:			
Year-round Salaried			52
Year-round Hourly			52
Seasonal Salaried			
Seasonal Hourly			
Other Tobacco Operations:			
Year-round Salaried			52
Year-round Hourly			52
Seasonal Salaried			
Seasonal Hourly			
Total		---	---

Thank you! If you have additional comments, please write them on the back of the survey.

Appendix 4.1 Comparison of USDA and Virginia Central District Farm Management Flue-cured Tobacco Budgets

Item	1995 Preliminary USDA	USDA Percentage (%)	1995 Virginia CDFM	Virginia Percentage (%)
Labor	709.60	20.39	* 696.00	16.09
Noncash benefits	24.16	0.69	* 208.09	4.81
Fertilizer and lime	221.58	6.37	117.23	2.71
Plant bed materials	45.90	1.32	51.02	1.18
Chemicals	219.77	6.32	314.90	7.28
Custom operations	7.99	0.23		0.00
Fuel and lubrications	58.33	1.68	96.13	2.22
Curing and heating fuel	290.25	8.34	165.38	3.82
Repairs	141.60	4.07	279.36	6.46
Warehouse fee	92.20	2.65	122.50	2.83
Assessments	15.46	0.44	21.00	0.49
Inspection and grading fee	16.04	0.46	26.00	0.60
Interest	22.00	0.63	69.30	1.60
Other	3.77	0.11	46.50	1.08
Total Variable Costs	1868.65	53.71	2213.41	51.18
Capital replacement	309.41	8.89	743.09	17.18
Return to other nonland capital	102.71	2.95		0.00
Taxes and Insurance	137.82	3.96	168.00	3.88
Total Ownership Costs	549.94	15.81	911.09	21.07
General farm overhead	225.27	6.47	** 200.00	4.62
Total, excluding land & quota	2643.86	75.99	3324.50	76.87
Land and quota charge	800.26	23.00	** 875.00	20.23
Total Costs	3444.12	98.99	4199.50	97.10
Management Returns	35.28	1.01	125.50	2.90
CASH RECEIPTS	3479.40	100.00	4325.00	100.00

Source: USDA budget is from "Costs of Producing and Selling Flue-cured Tobacco: 1993, 1994, and Preliminary 1995", by Dargan Glaze. The Virginia budget is from the Virginia Cooperative Extension, Central District Farm Management.

Note: The format used is from the USDA Budget. The Virginia Cooperative Extension Budget has been allocated and regrouped for comparison purposes.

* Higher by $19.69 than hired labor of $884.40 per Table 4.17.

** These numbers are the author's estimates. They are not supplied by the Central District Farm Management budget (Table 4.17).

Appendix 4.1.1 Hired Labor Expenditure Detail

Item	Domestic 30.00 %	Seasonal 20.00 %	H2A 50.00 %	Total	Percent of Total (%)
Wages	208.80	139.20	348.00	696.00	76.98
FICA	31.95	21.30		53.25	5.89
Other	6.89	4.59		11.48	1.27
Work. Comp.	13.57	9.05	22.62	45.24	5.00
Association Fees			7.00	7.00	0.77
Federal Fees			2.75	2.75	0.30
Travel			22.40	22.40	2.48
Subsistence			3.81	3.81	0.42
Housing			13.50	13.50	1.49
Electric/Fuel			4.95	4.95	0.55
Transport. H2A			3.46	3.46	0.38
Transport. Local	9.43	6.29		15.72	1.74
Porta Potty	1.98	1.32	3.3	6.60	0.73
Supplies	3.60	2.40	6.00	12.00	1.33
Insurance H2A			4.25	4.25	0.47
Insurance Local	1.01	0.67		1.68	0.19
Noncash Benefits	68.43	45.62	94.04	208.09	23.02
TOTAL HIRED LABOR	277.23	184.82	442.04	904.09	100.00

Appendix 4.2 Bridging Table for Industry 15 (Tobacco) Production Function

BUDGET ITEM	VALUE	% OF TOTAL	No.	IMPLAN Sector	IMPLAN %	Weighted Average	Final Allocation
Tobacco Seed	7.08	0.00164	15	Tobacco	0.00187		0.00164
Rye Seed	14.00	0.00324	14	Grass Seeds			0.00324
Chemicals	333.62	0.07714	204	Agricultural Chemicals	0.03370	0.95144	0.07339
			209	Chemical Preparations	0.00172	0.04856	0.00375
Lime	14.06	0.00325	245	Lime			0.00325
Fertilizer	109.43	0..02530	202	Nitrogenous & Phosphate Fertilizer	0.00857		0.02530
--Curing Fuel							
L.P. Gas	124.04	0.02868	444	Gas Prod. & Distribution	0.00019		0.02868
Fuel Oil	41.34	0.00956	210	Petroleum Refining	0.01581		0.00956
--Labor							
Domestic	208.80	0.04828		Value Added - Employee Comp.			0.04828
Seasonal	139.20	0.03218		Value Added - Employee Comp.			0.03218
H2A	348.00	0.08046		Value Added - Employee Comp.			0.08046
--Labor benefits							
FICA	53.25	0.01231		Value Added - Employee Comp.			0.01231
Unemployment Taxes	11.48	0.00265		Value Added - Employee Comp.			0.00265
Workers Comp.	45.24	0.01046		Value Added - Employee Comp.			0.01046
Association Fees	7.00	0.00162	503	Business Associations			0.00162
Federal Fees	2.75	0.00064	515	Other Fed. Gov. Enterprises			0.00064
H2A Travel & Subsistence	26.21	0.00606		Value Added - Employee Comp.			0.00606
Housing	13.50	0.00312	462	Real Estate	0.09414		0.00312
Transport - gas/mileage	19.18	0.00443	210	Petroleum Refining	0.01581		0.00443
Electric/Fuel	4.95	0.00114	443	Electric Services	0.00053		0.00114

Appendix 4.2 (Continued)

Porta Potty	6.60	0.00153	446	Sanitary Services	0.00055		0.00153
Supplies				Put with overhead, 12.00			
Insurance	5.93	0.00137	459	Insurance Carriers	0.02386		0.00137
Fuel	84.99	0.01965	210	Petroleum Refining	0.01581		0.01965
Oil and Lube	11.14	0.00258	213	Lubricating Oils & Grease	0.00116		0.00258
Repairs	279.36	0.06459	56	Maintenance and Repair Other	0.01659	0.26180	0.01691
			215	Tires & Inner Tubes	0.00734	0.11583	0.00748
			217	Rubber Hose & Belting	0.00106	0.01673	0.00108
			218	Gaskets, Packing & Seal.	0.00009	0.00142	0.00009
			284	Fabricated Plate Work	0.00012	0.00189	0.00012
			302	Steel Springs	0.00005	0.00079	0.00005
			350	Carburetors, Pistons	0.00117	0.01846	0.00119
			351	Fluid Power Cylinders	0.00046	0.00726	0.00047
			352	Fluid Power Pumps	0.00040	0.00631	0.00041
			379	Storage Batteries	0.00624	0.09847	0.00636
			381	Engine Electric. Equip.	0.00448	0.07070	0.00457
			386	Motor Vehicle Parts	0.00500	0.07890	0.00510
			451	Automotive Dealers	0.00062	0.00978	0.00063
			478	Auto. Parking & Car Wash	0.00003	0.00047	0.00003
			480	Electrical Repair Services	0.00095	0.01499	0.00097
			482	Misc. Repair Shops	0.01877	0.29620	0.01913
Annual Operating Capital	69.30	0.01602	456	Banking	0.00585	0.94507	0.01514
			457	Credit Agencies	0.00031	0.05008	0.00080
			458	Security & Comm. Brokers	0.00003	0.00485	0.00008

Appendix 4.2 (Continued)

Overhead	244.50	0.05653	26	Agriculture, For., Fish. Services	0.10631	0.48661	0.02751
(Includes Supplies from Labor Benefits and Building Insurance & Electric)			40	Dimension Stone	0.00115	0.00526	0.00030
			108	Broadwoven Fabric Mills	0.01376	0.06298	0.00356
			122	Cordage and Twine	0.00013	0.00060	0.00003
			147	Wood Products	0.00019	0.00087	0.00005
			171	Envelopes	0.00004	0.00018	0.00001
			175	Periodicals	0.00008	0.00037	0.00002
			176	Book Publishing	0.00006	0.00027	0.00002
			180	Manifold Business Forms	0.00004	0.00018	0.00001
			256	Steel Wire & Related	0.00017	0.00078	0.00004
			276	Hand & Edge Tools	0.00027	0.00124	0.00007
			304	Misc. Fabricated Wire Products	0.00065	0.00298	0.00017
			309	Farm Machinery & Equip.	0.02961	0.13553	0.00766
			322	Power Driven Hand Tools	0.00149	0.00682	0.00039
			338	General Industrial Mach.	0.00027	0.00124	0.00007
			354	Industrial Machines	0.00120	0.00549	0.00031
			357	Motors and Generators	0.00063	0.00288	0.00016
			367	Electric Lamps	0.00073	0.00334	0.00019
			369	Lighting Fixtures & Equip	0.00008	0.00037	0.00002
			428	Brooms and Brushes	0.00010	0.00046	0.00003
			432	Manufacturing Industries	0.00010	0.00046	0.00003
			441	Communications	0.00190	0.00870	0.00049
			447	Wholesale Trade	0.05150	0.23573	0.01333
			448	Build. Materials & Gardening	0.00035	0.00160	0.00009
			449	General Merchandise Stores	0.00070	0.00320	0.00018
			450	Food Stores	0.00111	0.00508	0.00029
			452	Apparel & Access. Stores	0.00043	0.00197	0.00011
			453	Furniture Stores	0.00040	0.00183	0.00010

Appendix 4.2 (Continued)

			454	Eating & Drinking Establishments	0.00003	0.00014	0.00001
			455	Misc. Retail	0.00120	0.00549	0.00031
			469	Advertising	0.00030	0.00137	0.00008
			473	Equip. Rental & Leasing	0.00048	0.00220	0.00012
			477	Auto. Rental & Leasing	0.00030	0.00137	0.00008
			494	Legal Services	0.00087	0.00398	0.00023
			507	Accounting & Bookkeeping	0.00112	0.00513	0.00029
			512	Other State & Local Gov.	0.00052	0.00238	0.00013
			513	U.S. Postal Service	0.00020	0.00092	0.00005
Crop Insurance	168.00	0.03884	515	Other Fed. Gov. Enterprises			0.03884
--Marketing Charges							
Warehouse Fee	122.50	0.02832	435	Motor Freight Transport			0.02832
Inspection and Grading	21.00	0.00486	515	Other Fed. Gov. Enterprises			0.00486
Assessments	26.00	0.00601	503	Business Associations			0.00601
--Building Insurance and Electric				Put with overhead, 32.50			
Plastic Cover	7.65	0.00177	220	Misc. Plastic Products	0.00493		0.00177
Remay Cover	10.31	0.00238	23	Greenhouse & Nursery Prod			0.00238
Straw	1.00	0.00023	13	Hay and Pasture			0.00023
Machinery & Equipment Fixed Costs	743.09	0.17181	309	Value Added - Proprietary			0.17181

Appendix 4.2 (Continued)

Quota Rental	875.00	0.20231		Value Added - Other Prop.			0.20231
SUBTOTAL	4199.50						
Management Returns	125.50	0.02902		Value Added - Proprietary			0.02902
TOTAL	4325.00	1.00					1.00

Appendix 4.3 Industry 15 (Tobacco) Production Function - Final Allocation Compared with the Original IMPLAN Allocation

No.	IMPLAN Sector	IMPLAN Allocation	Final Allocation	Difference
1	Dairy Farm Products	0.00020		-0.00020
2	Poultry and Eggs	0.00082		-0.00082
3	Ranch Fed Cattle	0.00002		-0.00002
4	Range Fed Cattle	0.00001		-0.00001
5	Cattle Feedlots	0.00003		-0.00003
6	Sheep, Lambs and Goats	0.00000		0.00000
7	Hogs, Pigs and Swine	0.00001		-0.00001
8	Other Meat Animal Prod.	0.00000		0.00000
9	Misc. Livestock	0.00511		-0.00511
13	Hay and Pasture		0.00023	0.00023
14	Grass Seeds		0.00324	0.00324
15	Tobacco	0.00187	0.00164	-0.00023
23	Greenhouse & Nursery Prod		0.00238	0.00238
26	Agriculture, For., Fish. Services	0.10631	0.02751	-0.07880
40	Dimension Stone	0.00115	0.00030	-0.00085
56	Maintenance and Repair Other	0.01659	0.01691	0.00032
108	Broadwoven Fabric Mills	0.01376	0.00356	-0.01020
122	Cordage and Twine	0.00013	0.00003	-0.00010
147	Wood Products	0.00019	0.00005	-0.00014
171	Envelopes	0.00004	0.00001	-0.00003
175	Periodicals	0.00008	0.00002	-0.00006
176	Book Publishing	0.00006	0.00002	-0.00004
180	Manifold Business Forms	0.00004	0.00001	-0.00003
202	Nitrogenous & Phosphate Fert.	0.00857	0.02530	0.01673
204	Agricultural Chemicals	0.03370	0.07339	0.03969
209	Chemical Preparations	0.00172	0.00375	0.00203
210	Petroleum Refining	0.01581	0.03364	0.01783
213	Lubricating Oils & Grease	0.00116	0.00258	0.00142
215	Tires & Inner Tubes	0.00734	0.00748	0.00014
217	Rubber Hose & Belting	0.00106	0.00108	0.00002
218	Gaskets, Packing & Seal.	0.00009	0.00009	0.00000
220	Misc. Plastic Products	0.00493	0.00177	-0.00316
245	Lime		0.00325	0.00325
256	Steel Wire & Related	0.00017	0.00004	-0.00013
276	Hand & Edge Tools	0.00027	0.00007	-0.00020
284	Fabricated Plate Work	0.00012	0.00012	0.00000
302	Steel Springs	0.00005	0.00005	0.00000
304	Misc. Fabricated Wire Prods.	0.00065	0.00017	-0.00048
309	Farm Machinery & Equip.	0.02961	0.00766	-0.02195
322	Power Driven Hand Tools	0.00149	0.00039	-0.00110
338	General Industrial Mach.	0.00027	0.00007	-0.00020
350	Carburetors, Pistons	0.00117	0.00119	0.00002

Appendix 4.3 (Continued)

351	Fluid Power Cylinders	0.00046	0.00047	0.00001
352	Fluid Power Pumps	0.00040	0.00041	0.00001
354	Industrial Machines	0.00120	0.00031	-0.00089
357	Motors and Generators	0.00063	0.00016	-0.00047
367	Electric Lamps	0.00073	0.00019	-0.00054
369	Lighting Fixtures & Equip	0.00008	0.00002	-0.00006
379	Storage Batteries	0.00624	0.00636	0.00012
381	Engine Electric. Equip.	0.00448	0.00457	0.00009
386	Motor Vehicle Parts	0.00500	0.00510	0.00010
428	Brooms and Brushes	0.00010	0.00003	-0.00007
432	Manufacturing Industries	0.00010	0.00003	-0.00007
433	Railroads & Related	0.00060		-0.00060
435	Motor Freight Transport	0.01624	0.02832	0.01208
436	Water Transportation	0.00017		-0.00017
437	Air Transportation	0.00027		-0.00027
438	Pipe Lines	0.00047		-0.00047
441	Communications	0.00190	0.00049	-0.00141
443	Electric Services	0.00053	0.00114	0.00061
444	Gas Prod. & Distribution	0.00019	0.02868	0.02849
446	Sanitary Services	0.00055	0.00153	0.00098
447	Wholesale Trade	0.05150	0.01333	-0.03817
448	Build. Materials & Gardening	0.00035	0.00009	-0.00026
449	General Merchandise Stores	0.00070	0.00018	-0.00052
450	Food Stores	0.00111	0.00029	-0.00082
451	Automotive Dealers	0.00062	0.00063	0.00001
452	Apparel & Access. Stores	0.00043	0.00011	-0.00032
453	Furniture Stores	0.00040	0.00010	-0.00030
454	Eating & Drinking Establishments	0.00003	0.00001	-0.00002
455	Misc. Retail	0.00120	0.00031	-0.00089
456	Banking	0.00585	0.01514	0.00929
457	Credit Agencies	0.00031	0.00080	0.00049
458	Security & Comm. Brokers	0.00003	0.00008	0.00005
459	Insurance Carriers	0.02386	0.00137	-0.02249
462	Real Estate	0.09414	0.00312	-0.09102
463	Hotels & Lodging Places	0.00095		-0.00095
469	Advertising	0.00030	0.00008	-0.00022
473	Equip. Rental & Leasing	0.00048	0.00012	-0.00036
477	Auto. Rental & Leasing	0.00030	0.00008	-0.00022
478	Auto. Parking & Car Wash	0.00003	0.00003	0.00000
480	Electrical Repair Services	0.00095	0.00097	0.00002
482	Misc. Repair Shops	0.01877	0.01913	0.00036
494	Legal Services	0.00087	0.00023	-0.00064
503	Business Associations		0.00763	0.00763
507	Accounting & Bookkeeping	0.00112	0.00029	-0.00083

Appendix 4.3 (Continued)

512	Other State & Local Gov.	0.00052	0.00013	-0.00039
513	U.S. Postal Service	0.00020	0.00005	-0.00015
515	Other Fed. Gov. Enterprises		0.04434	0.04434
	Value Added:			0.00000
	EMPLOY. COMP.	0.10480	0.19240	0.08760
	INDIRECT BUS. TAXES	0.01362		-0.01362
	PROPRIETARY INC.	0.11987	0.20083	0.08096
	OTHER PROP. INC.	0.26176	0.20231	-0.05945
	TOTAL	1.00001	1.00000	-0.00001

Appendix 5.1 Calculation of All Effects - Tobacco Output

	Direct Effects	Indirect Effects	Total Effects	Sum of Effects
FARMING			84.9592	84.9592
GALE			84.9583	84.9583
EXPEND			0.3936	0.3936
GALE-15	46.2738	38.6486		84.9224
Total				85.3160
EXPENDR			0.3879	0.3879
GALE-15	46.2738	38.6486		84.9224
Total				85.3103
ABSENTEE			0.3876	0.3876
GALE-15	46.2738	38.6486		84.9224
Total				85.3100
MRKTSHR			0.3884	0.3884
MRKTINI-15	42.4485	42.4746		84.9231
Total				85.3115
QUOTA10			0.3488	0.3488
QUOTAINI-15	41.6464	34.7838		76.4302
Total				76.7790
RPRICE			0.3864	0.3864
GALE3-15	46.2738	38.6486		84.9224
Total				85.3088
NOQUOTA			0..5773	0.5773
NOQUOINI-15	69.4107	57.9730		127.3837
Total				127.9610

Appendix 5.2 Calculation of All Effects - Stemming and Redrying Output

	Direct Effects	Indirect Effects	Total Effects	Sum of Effects
FARMING			0.0172	0.0172
GALE			584.8559	584.8559
EXPEND			0.0135	0.0135
GALE-107	520.1544	64.6782		584.8326
Total				584.8461
EXPENDR			0.0094	0.0094
GALE-107	520.1544	64.6782		584.8326
Total				584.8420
ABSENTEE			0.0092	0.0092
GALE-107	520.1544	64.6782		584.8326
Total				584.8418
MRKTSHR			0.0097	0.0097
MRKTINI-107	572.1699	71.1459		643.3158
Total				643.3255
QUOTA10			0.0082	0.0082
QUOTAINI-107	468.1390	58.2103		526.3493
Total				526.3575
RPRICE			0.0084	0.0084
GALE3-107	520.1544	64.6782		584.8326
Total				584.8410
NOQUOTA			0.0110	0.0110
NOQUOINI-107	780.2316	97.0172		877.2488
Total				877.2598

Appendix 5.3 Calculation of All Effects - Total Industry Output

	Direct Effects	Indirect Effects	Total Effects	Sum of Effects
FARMING			201.1967	201.1967
GALE			846.0023	846.0023
EXPEND			111.0766	111.0766
GALE-15	46.2738	38.6486		84.9224
GALE-107	520.1544	64.6782		584.8326
Total				780.8316
EXPENDR			87.7075	87.7075
GALE-15	46.2738	38.6486		84.9224
GALE-107	520.1544	64.6782		584.8326
Total				757.4625
ABSENTEE			86.5362	86.5362
GALE-15	46.2738	38.6486		84.9224
GALE-107	520.1544	64.6782		584.8326
Total				756.2912
MRKTSHR			91.8062	91.8062
MRKTINI-15	42.4485	42.4746		84.9231
MRKTINI-107	572.1699	71.1459		643.3158
Total				820.0451
QUOTA10			77.8827	77.8827
QUOTAINI-15	41.6464	34.7838		76.4302
QUOTAINI-107	468.139	58.2103		526.3493
Total				680.6622
RPRICE			81.9191	81.9191
GALE-15	46.2738	38.6486		84.9224
GALE-107	520.1544	64.6782		584.8326
Total				751.6741
NOQUOTA			113.7824	113.7824
NOQUOINI-15	69.4107	57.9730		127.3837
NOQUOINI-107	780.2316	97.0172		877.2488
Total				1118.4149

Appendix 5.4 Calculation of All Effects - Total Value Added

	Direct Effects	Indirect Effects	Total Effects	Sum of Effects
FARMING			123.1258	123.1258
GALE			307.4914	307.4914
EXPEND			67.4467	67.4467
GALE-15	27.5584	23.0172		50.5756
GALE-107	131.8016	16.3888		148.1904
Total				266.2127
			52.6275	52.6275
GALE-15	27.5584	23.0172		50.5756
GALE-107	131.8016	16.3888		148.1904
Total				251.3935
ABSENTEE			51.8847	51.8847
GALE-15	27.5584	23.0172		50.5756
GALE-107	131.8016	16.3888		148.1904
Total				250.6507
MRKTSHR			55.0437	55.0437
MRKTINI-15	25.2802	25.2957		50.5759
MRKTINI-107	144.9818	18.0276		163.0094
Total				268.6290
QUOTA10			46.6963	46.6963
QUOTAINI-15	24.8025	20.7155		45.5180
QUOTAINI-107	118.6214	14.7499		133.3713
Total				225.5856
RPRICE			48.9567	48.9567
GALE-15	27.5584	23.0172		50.5756
GALE-107	131.8016	16.3888		148.1904
Total				247.7227
NOQUOTA			67.6668	67.6668
NOQUOINI-15	41.3375	34.5258		75.8633
NOQUOINI-107	197.7024	24.5831		222.2855
Total				365.8156

Appendix 5.5 Calculation of All Effects - Total Employment (Jobs)

	Direct Effects	Indirect Effects	Total Effects	Sum of Effects
FARMING			6482.31	6482.31
GALE			8762.35	8762.35
EXPEND			2160.28	2160.28
GALE-15	2212.77	1848.14		4060.91
GALE-107	1034.4	128.62		1163.02
Total				7384.21
EXPENDR			1665.47	1665.47
GALE-15	2212.77	1848.14		4060.91
GALE-107	1034.4	128.62		1163.02
Total				6889.40
ABSENTEE			1640.76	1640.76
GALE-15	2212.77	1848.14		4060.91
GALE-107	1034.4	128.62		1163.02
Total				6864.69
MRKTSHR			1736.81	1736.81
MRKTINI-15	2029.85	2031.09		4060.94
MRKTINI-107	1137.83	141.48		1279.31
Total				7077.06
QUOTA10			1476.69	1476.69
QUOTAINI-15	1991.49	1663.33		3654.82
QUOTAINI-107	930.96	115.76		1046.72
Total				6178.23
RPRICE			1543.38	1543.38
GALE-15	2212.77	1848.14		4060.91
GALE-107	1034.4	128.62		1163.02
Total				6767.31
NOQUOTA			2123.22	2123.22
NOQUOINI-15	3319.15	2772.21		6091.36
NOQUOINI-107	1551.59	192.93		1744.52
Total				9959.10

Vita

William Brian Wise was born in Midland, Michigan in 1960. In 1982 he graduated from the University of Michigan with a Bachelor of Business Administration degree. After graduation he worked for four years at Arthur Young and Company in Chicago, Illinois. During that time he became a Certified Public Accountant. At the time of his departure from Arthur Young he served in a dual role as a Senior Auditor and a Senior Computer Auditor. He spent the next four years working for the LINC, Group Inc. LINC is a financial services company primarily engaged in healthcare leasing, also located in Chicago. During his time at LINC he oversaw the consolidation of computer operations when LINC bought a larger publicly owned competitor.

In 1990, he left the position of Director of Management Information Systems at LINC in order to join the Peace Corps. During his two years as a Peace Corps Volunteer he served as the Financial Management Advisor to the Solomon Islands Credit Union League. After completing his term of service with the Peace Corps, he moved to the neighboring country of Vanuatu. The next two years he served as a Special Project Accountant for the Vanuatu Development Bank. During this time he played a leading role in establishing a computer network and in implementing a new loans system at the bank.

In 1994 he returned to the United States to study Agricultural and Applied Economics at Virginia Polytechnic Institute and State University. He earned a Master of Science degree in July, 1996.