Impact of the University of Virginia on Charlottesville and Albemarle County

Eleanor G. May and Margo E. Hauck

May 1981

Tayloe Murphy Institute
The Colgate Darden Graduate School of Business Administration
University of Virginia

TAYLOE MURPHY INSTITUTE
Dynamics Building - 4th Floor
2015 Ivy Road
Charlottesville, Virginia 22903

Charles O. Meiburg
Director
Professor of Business Administration

Eleanor G. May
Research Director
Business Studies Center;
Professor of Business Administration

William J. Serow
Research Director
Population Studies Center;
Associate Professor

Julia H. Martin
Research Associate;
Assistant Professor

Michael A. Spar
Research Associate;
Assistant Professor

David C. Hodge
Research Economist

Barry A. Jackson
Illustrator

John L. Knapp
Research Director
Economic Studies Center;
Associate Professor

Charlotte H. Scott
Research Associate;
University Professor of Business Administration and Commerce

Research Assistants:

John A. Alexander
Mary Lynn Dubler
Jeffrey T. Frederick
Margo E. Hauck
James M. Heilman
Andrew M. Meade
Alice-Lynn Ryssman
Mary E. Tompkins

The Tayloe Murphy Institute, which was privately funded by friends of W. Tayloe Murphy and by the Virginia business community, began functioning in 1967 as a research affiliate of the University of Virginia Graduate School of Business Administration. In 1972 the Institute merged with the Bureau of Population and Economic Research, which had evolved from state population and economic research programs in the 1940's. The Tayloe Murphy Institute conducts research of potential usefulness to business, government, or the public.

UNIVERSITY OF VIRGINIA
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Preface

In the spring of 1980, Frank L. Hereford, Jr., President of the University of Virginia, asked the Tayloe Murphy Institute to conduct a new study of the economic impact of the University on the Charlottesville-Albemarle community. This publication reports on that study which brings up to date a similar study published by the Institute in 1973.

This study was supervised by Eleanor G. May, Research Director of the Business Studies Center, who also directed the earlier effort. The principal research work was conducted by Margo E. Hauck, Research Assistant.

The methodology used was once again based on the American Council on Education's Estimating the Impact of a College or University on the Local Economy.[1] That book, which describes a step-by-step procedure for data collection and interpretation, includes documentation from several studies conducted by the authors, John Caffrey and Herbert H. Isaacs. The models they developed were supplemented or modified in some areas, but in general the Virginia approach was similar to that constructed and tested by Caffrey and Isaacs.

However, because a number of changes were made to improve the methodology used for this study relative to that employed in the earlier study, we have not attempted to compare the findings of the two. In addition, this study was expanded to include some measures of the noneconomic impact

[1] John Caffrey and Herbert H. Isaacs, Estimating the Impact of a College or University on the Local Economy (Washington: American Council on Education, 1971).

of the University on the Charlottesville-Albemarle community. Estimates were gathered of the usage by residents of the area of various University facilities and activities. These measures are not included in the Caffrey-Isaacs methodology.

The completion of this study would have been impossible without the aid and cooperation of many people throughout the area. Within the business community, two men were particularly helpful: Leigh B. Middleditch, Jr., the 1980 president of the Charlottesville and Albemarle County Chamber of Commerce, served as liaison and Fred E. Ferguson, former executive vice president of the Chamber, helped mobilize the resources of that organization. A number of people at the University were instrumental in the success of the research including Kendal H. Gladish, Editor of Inside UVA, Peter L. Munger, University Comptroller, and Helaine Patterson, Director of Medical Center Information Services. In addition, the members of the faculty, staff, student body, and business community, who supplied information through mail surveys, and residents of Charlottesville and Albemarle, who were cooperative in reporting their usage of University services and facilities, made much of the study possible.

Members of the staff of the Tayloe Murphy Institute who deserve special credit for their hard work on many time-consuming tasks necessary for the completion of the report include Alice-Lynn Ryssman, Georgiana Shabanowitz, and Mary Tompkins. Barry A. Jackson did the graphics for the report.

Charles O. Meiburg
Director

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I. Introduction

Any institution affects and is affected by the community in which it is located. Certainly the existence of the University of Virginia is felt by the residents of the city of Charlottesville and of Albemarle County in many ways that go beyond the University's primary roles of teaching, research, and public service.

The University of Virginia is more than an institution of higher education. Founded by Thomas Jefferson, the University is deeply rooted in the history and tradition of the Charlottesville-Albemarle area. The Rotunda and the Grounds constantly remind one of the University's illustrious heritage.

The University is an active force in the daily life of the community. It provides the residents of the area with plays, concerts, athletic events, and other sources of entertainment. It also supplies the community with a modern medical center and with educational opportunities through adult education courses.

In spite of these positive benefits, the University can create problems, which arise not only from the University itself but also from adjustments necessitated by the University's growth. The University of Virginia is not a cloistered institution of higher learning--it is a dynamic force in the community.

The first University impact study, published in 1973, focused on the economic force of the institution in the Charlottesville-Albemarle area. In this current study, an attempt was made to determine not only the

economic, but also the cultural and community service impact. The economic activity was measured in terms of business volume, personal income, and employment. Both the direct and indirect impacts of each of these dimensions were examined.

The cultural and community impact of the University was measured by residents' use of facilities and events. Account was not taken of other effects of the University such as the upgrading of skilled and professional manpower or the contribution of scientific research to manufacturing and industry. In addition, no account was taken either of the effects beyond the local economy or of the effects on either local or nonlocal economies of the increased income and productivity as a result of University education. Nor was any attempt made to measure the volume of the many other intangibles the University adds to the Charlottesville and Albemarle area.

Most of the data used in the study are for the fiscal year ending June 1980, but some are for the 1979 calendar year. The discrepancies in the years covered, however, should not significantly detract from the conclusions reported here.

II. Economic Impact of the University

In the year 1979-1980, the University of Virginia, directly or indirectly, accounted for over $307 million of the Charlottesville-Albemarle business volume. (See Exhibit 1.) Through the direct expenditures of over $175 million by the University, faculty, staff, students, and visitors, additional indirect expenditures of nearly $132 million resulted.

These data were developed through the use of an adaptation of the models developed by John Caffrey and Herbert H. Isaacs for the American Council on Education's publication, Estimating the Impact of a College or University on the Local Economy.[1] A schematic representation of these models is shown in Exhibit 2. Descriptions of the models are included in Appendix A, with indication of the values and sources of data needed for the development of the models.

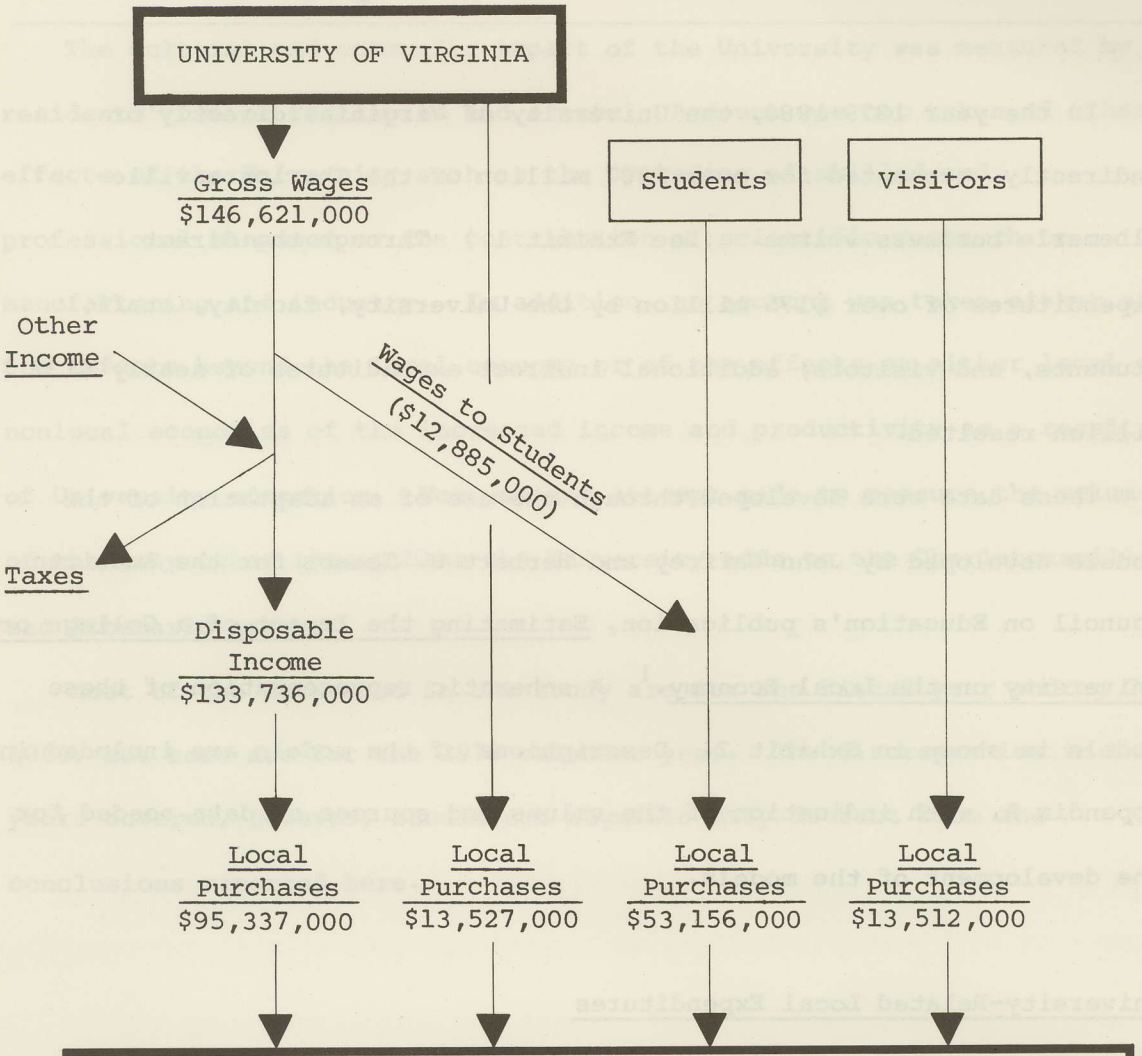
University-Related Local Expenditures

The University spent $13.5 million in the city of Charlottesville and Albemarle County for goods and services, as well as $146.6 million in payroll to faculty, staff, and student employees. The bulk of the University purchases outside the area were for medical supplies, publications, electronic equipment, and so forth, which were not

[1] John Caffrey and Herbert H. Isaacs, Estimating the Impact of a College or University on the Local Economy, (Washington: American Council on Education, 1971).

Exhibit 1

IMPACT OF THE UNIVERSITY ON CHARLOTTESVILLE-ALBEMARLE ECONOMY



LOCAL ECONOMY

	Total Impact	Direct	Indirect
Expenditures	$307,181,000	$175,532,000	$131,649,000
Employment	22,882	7,582*	15,300
Income	$230,864,000	$133,736,000	$97,128,000

*Full-time equivalent faculty and staff.

available in the Charlottesville-Albemarle market.

In the business survey, the members of the business commmunity reported they believed that an average of 19% of their total business was with the University. By using the Caffrey-Isaacs model, which measures direct and indirect business volume, it appears that the University accounted for an estimated 54% of the local business volume of $564 million.

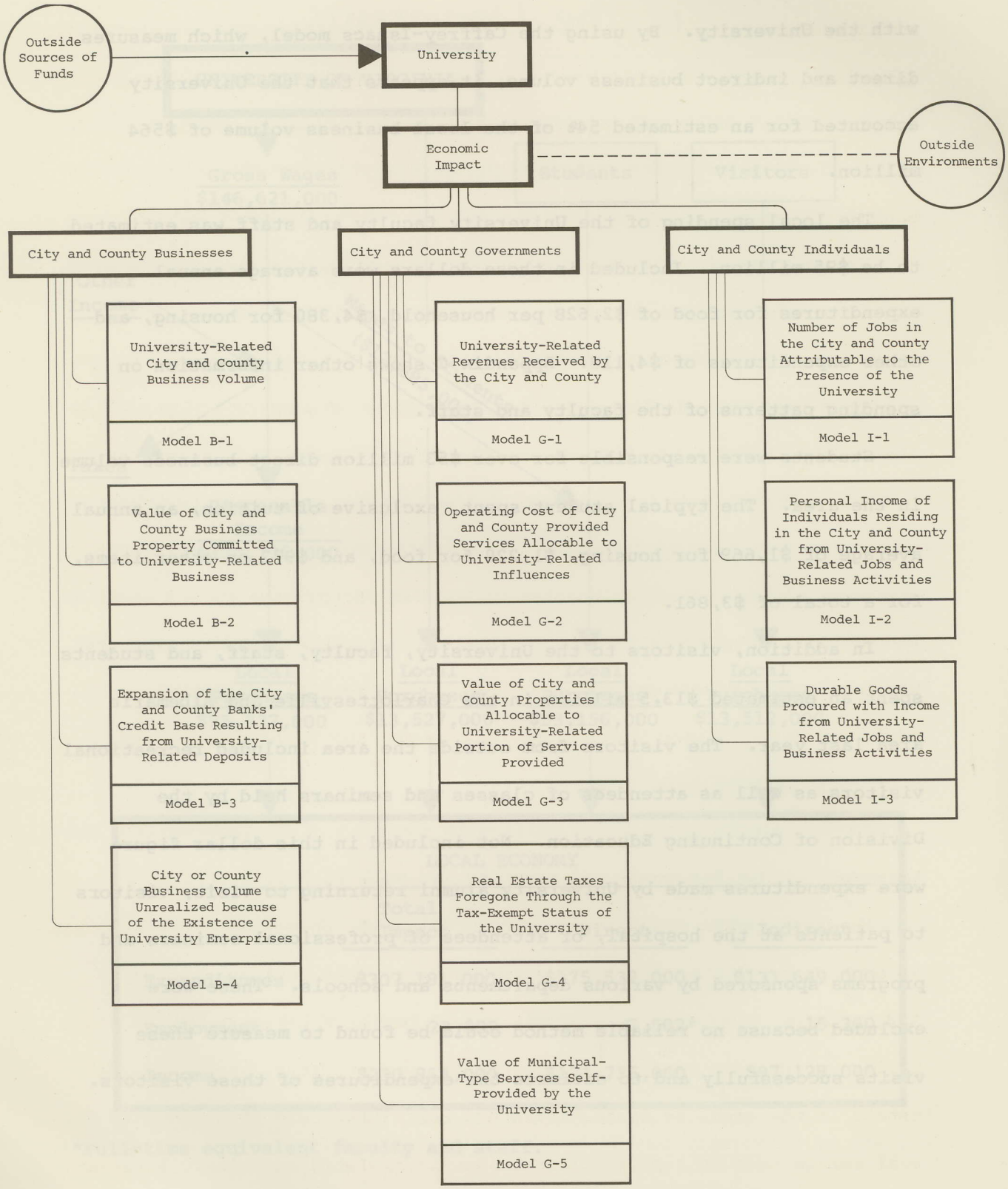
The local spending of the University faculty and staff was estimated to be $95 million. Included in those dollars were average annual expenditures for food of $2,628 per household, $4,380 for housing, and other expenditures of $4,118. Appendix C shows other information on spending patterns of the faculty and staff.

Students were responsible for over $53 million direct business volume in the area. The typical student spent, exclusive of tuition, an annual average of $1,669 for housing, $1,220 for food, and $972 on other items, for a total of $3,861.

In addition, visitors to the University, faculty, staff, and students spent an estimated $13.5 million in the Charlottesville and Albemarle area last year. The visitors from outside the area included recreational visitors as well as attendees of classes and seminars held by the Division of Continuing Education. Not included in this dollar figure were expenditures made by University alumni returning to visit, visitors to patients at the hospital, or attendees of professional seminars and programs sponsored by various departments and schools. These were excluded because no reliable method could be found to measure these visits successfully and to estimate the expenditures of these visitors.

Exhibit 2

SCHEMATIC REPRESENTATION OF IMPACT MODELS



Business Property

It was estimated that of the $559 million in business real property in Charlottesville and Albemarle, $305 million, or 55%, could be attributed to the needs of the University and to University-related needs. Likewise, business had $36.9 million in inventory and $130.7 million in other taxable assets to support its University-related business.

Bank Credit Base Expansion

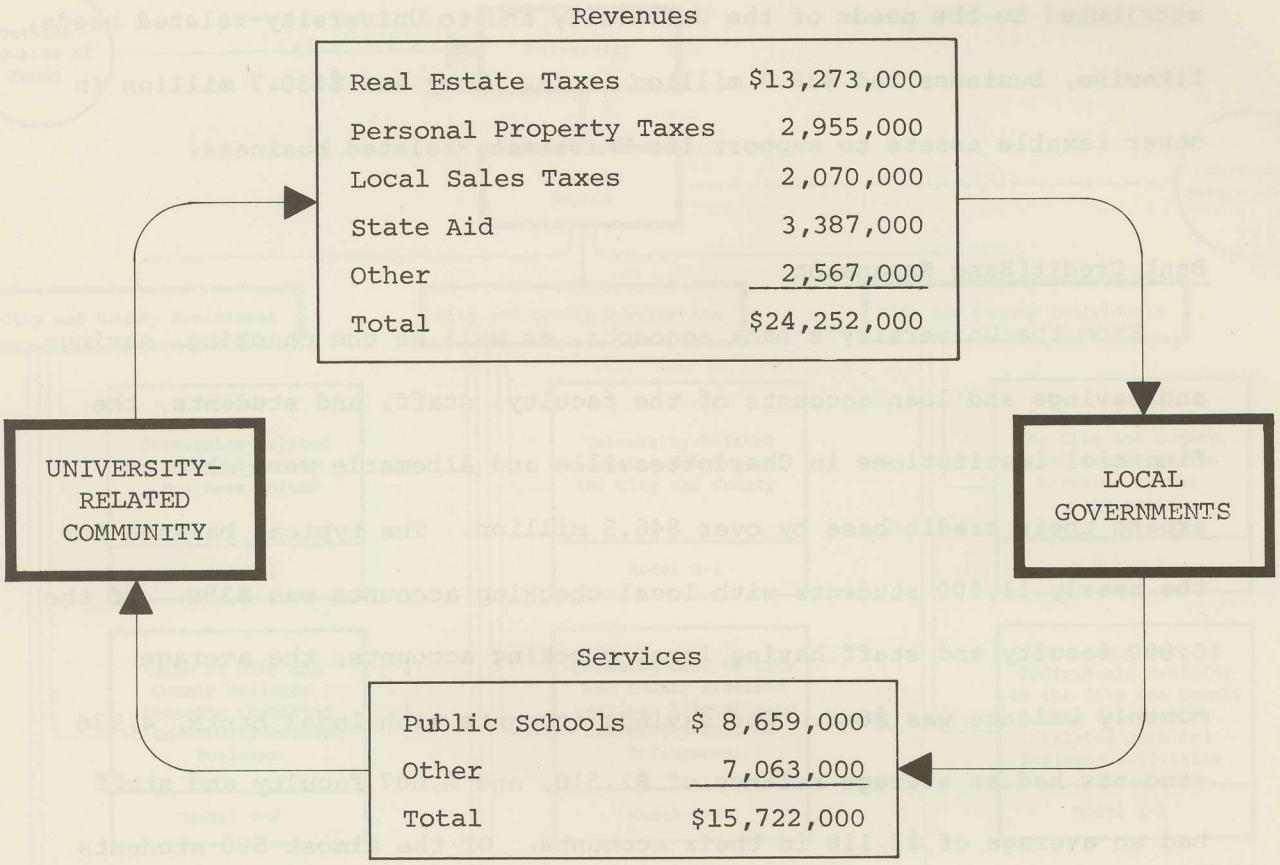
From the University's bank accounts, as well as the checking, savings, and savings and loan accounts of the faculty, staff, and students, the financial institutions in Charlottesville and Albemarle were able to expand their credit base by over $46.5 million. The typical balance for the nearly 11,000 students with local checking accounts was $358. Of the 6,800 faculty and staff having local checking accounts, the average monthly balance was $647. For savings accounts with local banks, 4,936 students had an average balance of $1,510, and 5,607 faculty and staff had an average of $2,118 in their accounts. Of the almost 500 students who had local savings and loan accounts, their average balance was $4,548, and $5,527 was the average balance for the 1,362 faculty and staff with this type of account.

University-Related Payments to Local Governments

Revenues to the Charlottesville and Albemarle governments attributable as a share to the University-related community were estimated to be $24,252,000. (See Exhibit 3.) These included real estate taxes of $13.3 million which were paid by faculty, staff, and students, who owned real estate in the area, by fraternities and sororities, and by businesses for real estate used to support their University-related business. Personal

Exhibit 3

IMPACT OF THE UNIVERSITY ON CHARLOTTESVILLE-ALBEMARLE GOVERNMENTS



property taxes paid to local governments amounted to nearly $3 million from the same groups, and sales tax revenues to the city and county from University-related business was estimated to be $2 million. State aid to Charlottesville and Albemarle attributable to the presence of the University was almost $3.4 million. Other University-related revenues collected by Albemarle and Charlottesville (auto registration fees, utility profits and taxes, and direct payments by the University to the city and county) amounted to $2.6 million.

Cost of Operating Local Government Allocable to the University

Of the total Charlottesville-Albemarle budgets of $45.5 million for 1979-1980, the estimated allocation to University-related influences for the 4,896 children of faculty, staff, and students in public school was $8,659,000. An additional $7.1 million was allocated to the University community for other municipal services, for a total of $15.7 million. See Exhibit 3 for a schematic representation of the impact of the University on the governmental operations of Charlottesville and Albemarle.

Municipal-Type Services Self-Provided

The University supplied some or all of its police and security, sanitation, and street lighting and maintenance. The value of this service in 1979-1980 was estimated to be $550,000.

Medical Center Services to Residents of the Area

The Medical Center provided both inpatient and outpatient services to residents of the Charlottesville-Albemarle area. During the year ending June 30, 1980, a total of 5,800 residents of the area were treated there. These 5,800 patients received 42,800 days of hospital care, while area residents made 62,600 visits to outpatient departments and 22,500 visits to the hospital's emergency room.

Insurance companies or federal and state agencies covered some of the payments for these services, but the Medical Center provided a substantial amount of medical services for free. During the same fiscal year, $1,469,100 worth of room, board, and ancillary services were supplied free to residents of Charlottesville and Albemarle at the University Hospital; at Blue Ridge Hospital, free service totaling $32,900 was provided. Out-

patients from Charlottesville and Albemarle who were treated at various hospital clinics, the Primary Care Center, and the Children's Rehabilitation Center received $3,553,900 in free medical service.

University-Related Effects on Area Employment

The University is the largest employer in the Charlottesville-Albemarle area. In 1979-1980, the University employed the equivalent of 7,582 full-time faculty and staff, over 14% of the total area workforce of 52,790. Through the multiplier effect, the University-related employment increases to 22,882 or 43% of the workers in Charlottesville-Albemarle.

University-Related Effects on Personal Income

Of the $147 million paid by the University to faculty, staff, and students in 1979-1980, $134 million went to residents of Charlottesville and Albemarle. An additional $97 million became personal income to the residents of the area as a result of the University expenditures, as well as the expenditures of the University employees, when these monies were spent and respent in the area. This means that the University helped to generate personal income of nearly $231 million in the Charlottesville-Albemarle area.

III. Noneconomic Impact of the University

It has been shown in Section II that the University of Virginia is a strong economic force in the Charlottesville-Albemarle community. However, beyond the dollars and cents aspect, the University also offers the community a variety of public services and events. Through the surveys of businesses and residents, an attempt was made to quantify the public use of these services. The University's events and facilities available to the public were combined into four general groups: educational, research, community service, and public events.

The courses offered through the Division of Continuing Education and the seminars and lectures given by the various academic departments were grouped into the educational category. The research category included use of the libraries on the Grounds, scientific research conducted under the auspices of the University, consultations by faculty members, and publications of the University.

The community service groups included the medical and health services, Madison House Volunteer Services, career placement, and student employment. The public events category considered the athletic, cultural, and social events sponsored in whole or in part by the University.

In the business survey, the respondents were asked in general terms, to what extent they used these four groups of University events and facilities. The categories given were "extensively," "frequently," "occasionally," or "never." Even though these measures are highly subjective, it has been shown in other studies that to seek a more exact

Exhibit 4

USE OF UNIVERSITY BY BUSINESS COMMUNITY

	Educational Services	Research Services	Community Services	Public Events
Extensively	1.7%	2.2%	3.1%	11.8%
Frequently	6.7	9.2	19.6	39.8
Occasionally	44.8	46.8	49.3	33.6
Never	42.3	38.4	24.1	13.2
No answer	4.5	3.4	3.9	1.6
Total	100.0%	100.0%	100.0%	100.0%

measure, e.g., how many hours are spent at a particular facility, tends to produce less reliable data because the responses are affected by the respondents' subjectivity. The residents were asked to use the more exact method, however, to facilitate the verbal exchange of the survey.

In the business community, the public events category was the most widely used by the 357 respondents, with the rest of the categories far seconds. (See Exhibit 4.) An important aspect of the business data was that all of the categories were used at least occasionally by the majority of the respondents.

When the residents' responses were grouped into the same four categories used for the businesses, it was found that 19% of the respondents had attended or had used an educational service at least once in the last year. The research services group, that is, libraries, were heavily used, with 31% of the respondents using the facilities at least once. Almost 52% of the respondents had used the community services, that is the Medical Center or Madison House services, in the past year. The heaviest usage, however, was again in the public events category, with 73%

Exhibit 5

USE OF UNIVERSITY BY RESIDENTS

Category	Percentage of Respondents Reporting Use in Past Year
Educational Services:	
Continuing Education	10%
Seminars or Lectures	11
Research Services:	
Libraries	31%
Community Services:	
Medical Center	50%
Madison House	5
Public Events:	
Basketball	40%
Football	41
Other Sports	7
Speaker Series	9
Tuesday Evening Concert Series	10
Charlottesville Symphony Orchestra	9
McIntire Department of Music Performances	5
Virginia Players	28
Artists' Series	7
Films	9
Bayly Museum	25
Tour of Grounds and Rotunda	23

of the residents polled reporting attendance at some of these events within the last year.

In the residents' survey, it was found that 82% of those questioned had used a facility or attended an event sponsored by the University in the past year. Exhibit 5 gives a more detailed listing of responses to the questionnaire and Exhibit 6 illustrates the number of visits last year by residents to each event or facility category. Exhibit 7 shows a breakdown of the characteristics of the respondents, e.g., place of residence, sex, income.

Exhibit 6

NUMBER OF VISITS BY RESIDENTS TO UNIVERSITY EVENTS AND FACILITIES

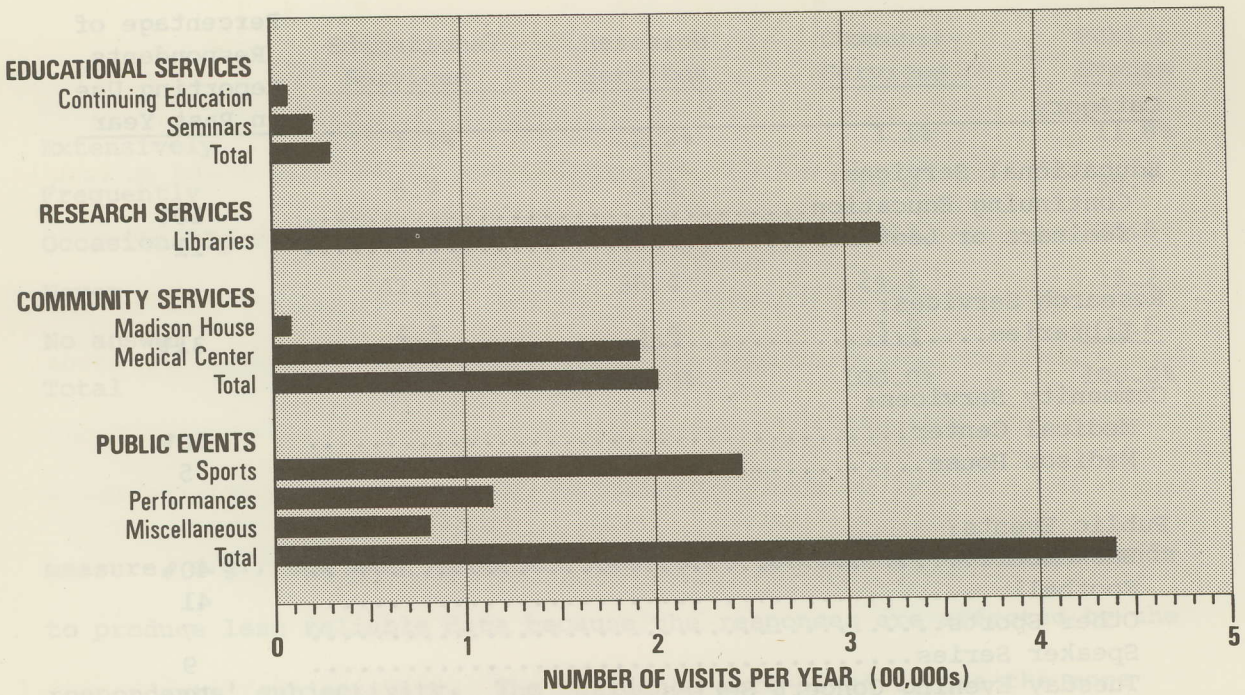


Exhibit 7

PROFILE OF RESPONDENTS TO RESIDENTS SURVEY

Place of Residence:	
Charlottesville	48.7%
Albemarle	49.5
No answer	1.8
	100.0%
Sex of Respondent:	
Male	36.3%
Female	62.1
No answer	1.6
	100.0%
Average Number of People per Household	2.8
Average Income	$19,200
Average Number of Years in Area	19.6

Appendix A. Impact Models

Following are descriptions and development of the models and submodels used in this survey, as adapted from the Caffrey-Isaacs publication.[1] Also included are the data used to calculate the models, as well as the values developed for each model. The sources of the data, whether actual or estimated, are indicated as references.

The models include those for the economic impacts on local businesses, local governments, and local individuals.

The business models and submodels estimate the values of: direct purchases from local businesses made by the University and faculty, staff, students, and visitors; purchases from local sources by local businesses in support of University-related business volume; and local business volume stimulated by the expenditure of college-related income by local individuals other than faculty, staff, or students.

The government models and submodels estimate the values of: taxes and other revenues received by Charlottesville and Albemarle as a result of the presence of the University and University-related individuals and activities; and government-

[1] John Caffrey and Herbert H. Isaacs, Estimating the Impact of a College or University on the Local Economy, (Washington: American Council on Education, 1971).

provided municipal and school services allocable to University-related individuals.

The individual models and submodels estimate: the number of local jobs attributable to the presence of the college; the personal income of local individuals from University-related jobs and business activities; and the value of durable goods procured with income from University-related jobs and business activities.

The nomenclature for the models and submodels provides a consistent numbering and lettering framework. The business models are labeled B; the government models, G; the individual models, I. The numbering indicates which submodels should be combined to produce the value of a model; i.e., B-1.1 = B-1.1.1 + B-1.1.2 + B-1.1.3 + B-1.1.4. The notation scheme uses capital letters for amounts and lowercase letters for coefficients. An asterisk on a letter indicates that the value is a subset; i.e., f_L is the proportion of faculty and staff residing locally, while f_L^* is the proportion of faculty and staff residing locally in nonuniversity housing.

BUSINESS MODELS

Variable	Description	Value	Source
Model B-1			
University-Related City and County Business Volume			
$B\text{-}1 = B\text{-}1.1 + B\text{-}1.2 + B\text{-}1.3$		$307,181,000	
Model B-1.1			
University-Related City and County Expenditures			
$B\text{-}1.1 = B\text{-}1.1.1 + B\text{-}1.1.2 + B\text{-}1.1.3 + B\text{-}1.1.4$		$175,532,000	
Model B-1.1.1			
City and County Expenditures by the University			
$B\text{-}1.1.1 = (e_L)_C(E_C - W_{F,S} - XF_C - R_C)$		$13,527,000	
$(e_L)_C$ =	Proportion of university nonpayroll expenditures that are paid to businesses in the city or county	0.20	University Purchasing
E_C =	Total university expenditures	$222,231,000	University of Virginia Financial Report 1978-79
$W_{F,S}$ =	Total compensation to faculty, staff, and students	$146,621,000	University Comptroller
XF_C =	Internal account transfers and payments	$7,797,000	University of Virginia Financial Report 1978-79
R_C =	Payments to the city and county--city	$67,000	University Comptroller
	--county	$110,000	
Model B-1.1.2			
City and County Expenditures by Faculty and Staff			
$B\text{-}1.1.2 = B\text{-}1.1.2.1 + B\text{-}1.1.2.2 + B\text{-}1.1.2.3$		$95,337,000	
Model B-1.1.2.1			
Expenditures by Faculty and Staff for City and County Rental Housing			
$B\text{-}1.1.2.1 = (f_{LH})(DI_F)(e_H)$		$10,003,000	
f_{LH} =	Proportion of faculty and staff renting nonuniversity housing in the city or county	0.34	Faculty/staff survey
DI_F =	Total income of faculty and staff	$133,736,000	University Comptroller
e_H =	Proportion of a renter's total expenditures spent for housing	0.22	Autumn 1979 Urban Family Budgets and Comparative Indexes for Selected Urban Areas, U.S. Department of Labor, Bureau of Labor Statistics, 1980

Variable	Description	Value	Source
Model B-1.1.2.2			
	Nonhousing Expenditures in the City and County by Faculty and Staff Residing in the City or County		
$B\text{-}1.1.2.2$ =	$(f_L)(e_L)(DI_F)(e_{NH})_F$	$82,617,000	
f_L =	Proportion of faculty and staff residing in the..... city or county	0.90	Faculty/staff survey
e_L =	Proportion of total nonhousing expenditures that.... an individual is likely to make in the city or county	0.88	Calculations explained in Appendix B
DI_F =	Total income of faculty and staff.....	$133,736,000	University Comptroller
$(e_{NH})_F$ =	Proportion of a consumer's total expenditures..... spent on nonhousing items	0.78	Autumn 1979 Urban Family Budgets and Comparative Indexes for Selected Urban Areas, U.S. Department of Labor, Bureau of Labor Statistics, 1980
Model B-1.1.2.3			
	Expenditures in the City and County by Faculty and Staff Not Residing in the City or County		
$B\text{-}1.1.2.3$ =	$(1 - f_L)(F)(E_1)_F$	$2,717,000	
f_L =	Proportion of faculty and staff residing in the..... city or county	0.90	Faculty/staff survey
F =	Number of faculty and staff (fulltime equivalent)...	7,582	Data Digest, 1980, Office of Institutional Analysis, University of Virginia
$(E_1)_F$ =	Average expenditures in the city or county by..... each faculty and staff person not residing in the city or county	$3,584	Faculty/staff survey
Model B-1.1.3			
	Expenditures in the City and County by Students		
$B\text{-}1.1.3$ =	$B\text{-}1.1.3.1 + B\text{-}1.1.3.2 + B\text{-}1.1.3.3 + B\text{-}1.1.3.4 + B\text{-}1.1.3.5$	$53,156,000	
Model B-1.1.3.1			
	Expenditures in the City or County, Exclusive of Room and Board, by Students Obtaining Room and Board in Dormitories, Fraternities, or with Parents in the City or County		
$B\text{-}1.1.3.1$ =	$(S_L)(E_m)_S(e_L)$	$3,850,000	

Variable		Description	Value	Source
S_L	=	Number of students obtaining room and board..... from dormitories, fraternities, or with parents in the city or county	5,594	Student survey and University Registrar
$(E_m)_S$	=	Average expenditures, exclusive of room and board,.. per student of this type	$782	Student survey
e_L	=	Proportion of total nonhousing expenditures that.... a student is likely to make in the local environment	0.88	Calculations explained in Appendix B
Model B-1.1.3.2				
Expenditures by Students for Rental Housing in the City or County				
B-1.1.3.2	=	$(S_H^*)(E_h)_S$.....	$18,368,000	
S_H^*	=	Number of students renting housing in the city..... or county	9,760	Student survey and University Registrar
$(E_h)_S$	=	Average rental expenditures per student.....	$1,882	Student survey
Model B-1.1.3.3				
Nonhousing Expenditures in the City or County by Students Who Rent Housing in the City or County				
B-1.1.3.3	=	$(S_H)(E_{nh})_S(e_L)$.....	$29,675,000	
S_H	=	Number of students renting housing, including..... university housing, in the city or county	15,384	Student survey and University Registrar
$(E_{nh})_S$	=	Average nonhousing expenditures per student.....	$2,192	Student survey
e_L	=	Proportion of total nonhousing expenditures that.... a student is likely to make in the local environment	0.88	Calculations explained in Appendix B
Model B-1.1.3.4				
Expenditures in the City or County by Students Not Living in the City or County				
B-1.1.3.4	=	$(S_{NL})(E_1)_S$.....	$536,000	
S_{NL}	=	Number of students not living in the city or..... county	494	Student survey and University Registrar
$(E_1)_S$	=	Average expenditures in the city or county by..... students not living in the city or county	$1,085	Student survey

Variable	Description	Value	Source
Model B-1.1.3.5			
Expenditures in the City or County by Fraternities and Sororities			
B-1.1.3.5 =	$(E_{LGH})_S + (E_{LGO})_S(e_{LGNH})_S$	$727,000	
$(E_{LGH})_S$ =	Expenditures by fraternities and sororities for rental housing	$408,000	Fraternity/sorority survey
$(E_{LGO})_S$ =	Operating and food expenditures of fraternities and sororities	$362,000	Fraternity/sorority survey
$(e_{LGNH})_S$ =	Proportion of nonhousing expenditures made in the city or county by living groups	0.88	Calculations explained in Appendix B
Model B-1.1.4			
Expenditures in the City or County by Visitors to the University			
B-1.1.4 =	$(V_1)(E_1)_V + (V_2)(E_2)_V + (V_3)(E_3)_V + (V_4)(E_4)_V$	$13,512,000	
V_1 =	Number of out-of-town visits to the university by recreational visitors	16,194	Athletic Department
$(E_1)_V$ =	Expenditures in the city or county by each recreational visitor to the university	$20	Assumed
V_2 =	Number of visits to the university by educational visitors	11,955	Division of Continuing Education
$(E_2)_V$ =	Expenditures in the city or county by each educational visitor to the university	$120	Assumed, based on 3-day visit, $40 per day
V_3 =	Number of visits to students at the university	198,500	Student survey and University Registrar
$(E_3)_V$ =	Expenditures in the city or county by each visitor to students	$35	Student survey
V_4 =	Number of visits to faculty and staff at the university	120,150	Faculty/staff survey and Data Digest, 1980
$(E_4)_V$ =	Expenditures in the city or county by each visitor to faculty and staff	$40	Faculty/staff survey
Model B-1.2			
Purchases from City or County Sources by City and County Businesses in Support of Their University-Related Volume			
B-1.2 =	$(B\text{-}1.1)(m_p)$	$26,330,000	
B-1.1 =	University-related city and county expenditures	$175,532,000	Model B-1.1

Variable	Description	Value	Source
m_p =	Coefficient representing the degree to which businesses purchase goods and services from city and county sources	0.15	Business survey

Model B-1.3

City and County Business Volume Stimulated by the Expenditure of University-Related Income by Individuals Other Than Faculty, Staff, or Students

$B\text{-}1.3 = (B\text{-}1.1)(m_i)$		$105,319,000	
B-1.1 =	University-related city and county expenditures	$175,532,000	Model B-1.1
m_i =	Coefficient representing the degree to which individual income received from city and county business activity is spent and respent locally	0.60	Business survey

Model B-2

Value of City and County Business Property Committed to University-Related Business

$B\text{-}2 = B\text{-}2.1 + B\text{-}2.2 + B\text{-}2.3$		$472,324,000	

Model B-2.1

Value of City and County Business Real Property Committed to University-Related Business

$B\text{-}2.1 = \left(\frac{B\text{-}1}{BV_L}\right)\left(\frac{V_B}{amv}\right)$		$304,791,000	
B-1 =	University-related city or county business volume	$307,181,000	Model B-1
BV_L =	City and county business volume--city	$435,488,000	U.S. Bureau of the Census, Census of Business: Retail Trade-Virginia (RC77-A-47), Wholesale Trade-Virginia (WC77-A-47), Services-Virginia (SC77-A-47); Taxable Sales in Virginia County and Cities 1979, Department of Taxation, Commonwealth of Virginia, Richmond
	--county	$128,043,000	
V_B =	Value of business real property--city	$277,487,000	Inflated to 1980 values from data from the following sources: Annual Report, June 30, 1972, Department of Taxation, Richmond, Virginia; Charlottesville and Albemarle County, May 1971, VEPCO Area Development; U.S. Bureau of the Census, Census of Housing: 1970 General Housing Characteristics, Final Report HC (1)-B48
	--county	$281,660,000	
amv =	Ratio of assessed value to market value of taxable real property	1.00	City and county governments

Variable	Description	Value	Source
Model B-2.2			
	Value of City and County Business Inventory Committed to University-Related Business		
$B\text{-}2.2 = (ibv)(B\text{-}1)$		$36,862,000	
ibv =	Inventory-to-business-volume ratio	0.12	Estimating the Impact of a College or University on the Local Economy, John Caffrey and Herbert H. Isaacs
$B\text{-}1$ =	University-related city and county business volume	$307,181,000	Model B-1
Model B-2.3			
	Value of City and County Business Property, Other Than Real Property and Inventory, Committed to University-Related Business		
$B\text{-}2.3 = (OP_L)\left(\frac{B\text{-}1}{BV_L}\right)$		$130,671,000	
OP_L =	Value of city and county business property other than real estate--city	$118,901,000	Inflated to 1980 values from data from: Annual Report, June 30, 1972, and unpublished data, Department of Taxation, Commonwealth of Virginia
	--county	$120,819,000	
$B\text{-}1$ =	University-related city and county business volume	$307,181,000	Model B-1
BV_L =	City and county business volume--city	$435,488,000	Model B-2.1
	--county	$128,043,000	
Model B-3			
	Expansion of the City and County Banks' Credit Base Resulting from University-Related Deposits		
$B\text{-}3 = (1 - t)[TD_c + (TD_{f1})(F_1) + (TD_{f2})(F_2) + (TD_{s1})(S_1) + \ldots$		$46,535,000	
$(TD_{s2})(S_2)] + (1 - d)[DD_c + (DD_f)(F_3) + (DD_s)(S_3) +$			
$(cbv)(B\text{-}1)]$			
t =	Virginia time deposit reserve requirement	0.03	Federal Reserve Bulletin, July 1980
TD_c =	Average time deposit of the university in city or county banks	$0	University of Virginia Business Office
TD_{f1} =	Average deposit (savings) of each faculty and staff having an account in the city or county	$2,118	Faculty/staff survey
F_1 =	Number of faculty and staff having time deposit (savings) accounts in the city or county	5,607	Faculty/staff survey and Data Digest, 1980
TD_{f2} =	Average time deposit (savings and loans) of each faculty and staff having an account in the city or county	$5,527	Faculty/staff survey

Variable		Description	Value	Source
F_2	=	Number of faculty and staff having time deposit..... (savings and loan) accounts in the city or county	1,362	Faculty/staff survey and Data Digest, 1980
TD_{s1}	=	Average time deposit (savings) of each student..... having an account in the city or county	$1,510	Student survey
S_1	=	Number of students having time deposit (savings).... accounts in the city or county	4,936	Student survey and University Registrar
TD_{s2}	=	Average time deposit (savings and loan) of each..... student having an account in the city or county	$4,548	Student survey
S_2	=	Number of students having time deposit..... (savings and loan) accounts in the city or county	494	Student survey and University Registrar
d	=	Virginia demand deposit reserve requirement.....	0.1275	Federal Reserve Bulletin, July 1980
DD_c	=	Average demand deposit of the university in city.... or county banks	$1,321,748	University of Virginia Business Office
DD_f	=	Average demand deposit of each faculty and staff.... having an account in the city or county	$647	Faculty/staff survey
F_3	=	Number of faculty and staff having demand..... deposit accounts in the city or county	6,808	Faculty/staff survey and Data Digest, 1980
DD_s	=	Average demand deposit of each student having an.... account in the city or county	$358	Student survey
S_3	=	Number of students having demand deposit accounts... in the city or county	10,858	Student survey and University Registrar
cbv	=	Cash-to-business-volume ratio.....	0.037	Business survey
B-1	=	University-related city and county business volume..	$307,181,000	Model B-1
Model B-4				
City or County Business Volume Unrealized because of the Existence of University Enterprises				
B-4 = $(I_{BV})_C$	=	Income received by the university from the..... operation of ongrounds university-owned business enterprises	$18,103,000	University of Virginia Financial Report 1978-79

GOVERNMENT MODELS

Variable	Description	Value	Source
Model G-1			
	University-Related Revenues Received by the City and County		
$G\text{-}1 = G\text{-}1.1 + G\text{-}1.2 + G\text{-}1.3 + G\text{-}1.4 + G\text{-}1.5$		$24,252,000	
Model G-1.1			
	University-Related Real-Estate Taxes Paid to the City and County		
$G\text{-}1.1 = G\text{-}1.1.1 + G\text{-}1.2 + G\text{-}1.3 + G\text{-}1.4$		$13,273,000	
Model G-1.1.1			
	Real-Estate Taxes Paid to the City or County by Faculty, Staff, and Students		
$G\text{-}1.1.1 = (F_L^* + S_{LO}^*)\ (pt)(V_{PR})$		$1,974,000	
F_L^* =	Number of private residences occupied by faculty and staff--city	1,744	Faculty/staff survey and Data Digest, 1980
	--county	2,199	
S_{LO}^* =	Number of private residences occupied by students--city	329	Student survey and University Registrar
	--county	329	
pt =	Property tax rates--city	0.0129	City and county governments
	--county	0.0088	
V_{PR} =	Average value of private residences--city	$39,400	Inflated to 1980 values from data from: U.S. Bureau of the Census, Census of Housing: 1970 General Housing Characteristics, Final Report HC (1)-A-48 Virginia; Annual Report, Department of Taxation, Richmond, Virginia, June 30, 1972
	--county	$41,370	
Model G-1.1.2			
	Real-Estate Taxes Paid to the City and County by Fraternities and Sororities		
$G\text{-}1.1.2 = (R_{RE})_{S1}$ =	Real-estate taxes paid to the city and county by fraternities and sororities	$40,000	Fraternity/sorority survey
Model G-1.1.3			
	Real-Estate Taxes Paid to the City and County for Properties Rented by Faculty, Staff, and Students		
$G\text{-}1.1.3 = [(F_{LR}^*) + (S_L^*)](AR_L)(pt)$		$2,788,000	
F_{LR}^* =	Number of faculty and staff residing in rental housing in the city or county--city	1,289	Faculty/staff survey and Data Digest, 1980
	--county	1,137	

Variable		Description	Value	Source
S_L*	=	Number of student households in--city	7,897	Student survey and University Registrar
		nonuniversity rental housing in the city or county --county	1,810	
AR_L	=	Average value per rental unit	$19,306	U.S. Bureau of the Census, Construction Reports, Series C20
pt	=	Property tax rates--city	0.0129	City and county governments
		--county	0.0088	

Model G-1.1.4

Real-Estate Taxes Paid to the City and County by Businesses for Real Property Allocable to University-Related Business

$$G\text{-}1.1.4 = (B\text{-}1)\left(\frac{pt}{BV_L}\right)(V_B)$$ $8,471,000

B-1	=	University-related city and county business volume	$307,181,000	Model B-1
pt	=	Property tax rates--city	0.0129	City and county governments
		--county	0.0088	
BV_L	=	City and county business volume--city	$435,488,000	Model B-2.1
		--county	$128,043,000	
V_B	=	Value of business real estate--city	$277,487,000	Model B-2.1
		--county	$281,660,000	

Model G-1.2

University-Related Personal Property Taxes Paid to the City and County

G-1.2 = G-1.2.1 + G-1.2.2 + G-1.2.3 + G-1.2.4 ..... $2,955,000

Model G-1.2.1

Tangible Personal Property Taxes Paid to the City and County by Faculty, Staff, and Students

$$G\text{-}1.2.1 = \left(\frac{F_L + S_C}{a_C}\right)\left(\frac{R_{PP}}{T_C}\right)$$ $861,000

F_L	=	Number of faculty and staff residing in the city or county	6,889	Faculty/staff survey and Data Digest, 1980
S_C	=	Number of students owning cars	5,933	Student survey and University Registrar
a_C	=	Number of cars per household	1.66	Registration figures from Department of Motor Vehicles for 1980 for city and county
R_{PP}	=	Tangible personal property taxes paid to the city or county--city	$1,382,000	Annual Report, Department of Taxation, 1978-79
		--county	$2,669,000	
T_C	=	Number of households in the city and county--city	16,308	U.S. Bureau of the Census, 1980 Advance Counts
		--county	20,053	

Variable	Description	Value	Source
Model G-1.2.2			
Tangible Personal Property Taxes Paid to the City and County by Fraternities and Sororities			
$G\text{-}1.2.2 = (R_{NRE})_{S1}$	= Non-real property taxes paid to the city and county by fraternities and sororities	$210	Fraternity/sorority survey
Model G-1.2.3			
Machinery and Tool Taxes and Public Service Corporation Taxes Paid to the City and County by Businesses for Assets Allocable to University-Related Business			
$G\text{-}1.2.3 = (R_{mp})\left(\frac{B\text{-}1}{BV_L}\right)$		$881,000	
R_{mp}	= Machinery and tool taxes and public service corporation taxes paid to the city and county	--city: $799,000 --county: $817,000	Annual Report, Department of Taxation, 1978-79
B-1	= University-related city and county business volume	$307,181,000	Model B-1
BV_L	= City and county business volume	--city: $435,488,000 --county: $128,043,000	Model B-2.1
Model G-1.2.4			
Business License Fees Paid to the City and County by Businesses as a Result of University-Related Business			
$G\text{-}1.2.4 = (R_{bl})\left(\frac{B\text{-}1}{BV_L}\right)$		$1,213,000	
R_{bl}	= Business license fees paid to the city and county	--city: $1,520,000 --county: $705,000	City and county 1980-81 budgets
B-1	= University-related city and county business volume	$307,181,000	Model B-1
BV_L	= City and county business volume	--city: $435,488,000 --county: $128,043,000	Model B-2.1
Model G-1.3			
Sales Tax Revenue Received by the City and County as a Result of University-Related Purchases			
$G\text{-}1.3 = (ST_L)\left(\frac{(B\text{-}1) - (B\text{-}1.1.1)}{BV_L}\right)$		$2,070,000	
ST_L	= Sales tax collected for the city and county	--city: $2,679,000 --county: $1,294,000	Annual Report, Department of Taxation, 1978-79
B-1	= University-related city and county business volume	$307,181,000	Model B-1

Variable		Description	Value	Source
$B\text{-}1.1.1$	=	City and county expenditures by the university.....	$13,527,000	Model B-1.1.1
BV_L	=	City and county business volume--city.....	$435,488,000	Model B-2.1
		--county.....	$128,043,000	

Model G-1.4

State Aid to the City and County Allocable to the Presence of the University

$G\text{-}1.4 = G\text{-}1.4.1 + G\text{-}1.4.2 + G\text{-}1.4.3$..... $3,387,000

Model G-1.4.1

State Aid to City and County Public Schools Allocable to Children of University-Related Families

$$G\text{-}1.4.1 = (A_{PS}) \left(\frac{(CH_{PS})_F + (CH_{PS})_S}{CH_{PS}} \right)$$ $2,099,000

A_{PS}	=	State aid to city and county public schools--city.....	$2,378,000	Annual Report of the Superintendent of Public Instruction of the Commonwealth of Virginia, School Year 1978-79
		--county.....	$4,547,000	
$(CH_{PS})_F$	=	Number of faculty and staff children attending city or county public schools.....	3,837	Faculty/staff survey and Data Digest, 1980
$(CH_{PS})_S$	=	Number of students' children attending city or county public schools.....	1,059	Student survey and University Registrar
CH_{PS}	=	Number of children attending city--city.....	5,872	Annual Report of the Superintendent of Public Instruction of the Commonwealth of Virginia, School Year 1978-79
		or county public schools --county.....	10,281	

Model G-1.4.2

State Aid to City or County Allocable to University-Related Community

$$G\text{-}1.4.2 = (P_{ABC}) \left(\frac{FH_L + SH_L}{POP_{LR}} \right)$$ $226,000

P_{ABC}	=	City and county share of ABC profits--city.....	$180,000	City and county budgets
		--county.....	$200,000	
FH_L	=	Number of persons in faculty and staff households residing in city or county...	21,146	Faculty/staff survey and Data Digest, 1980
SH_L	=	Number of persons in student households residing in city or county....	35,865	Student survey and University Registrar
POP_{LR}	=	Population--city.....	45,010	U.S. Bureau of the Census, 1980 Advance Counts
		--county.....	50,689	

Variable	Description	Value	Source
Model G-1.4.3			
	State Aid to the City and County Allocable to Children of University-Related Families		
$G\text{-}1.4.3 = (ST_{SL}) \left(\frac{(CH_S)_F + (CH_S)_S}{CH_S} \right)$		$1,062,000	
ST_{SL} =	Portion of revenues from state sales tax distributed by state to localities	$179,059,000	Annual Report, Department of Taxation, 1978-79
$(CH_S)_F$ =	Number of faculty and staff children of school age	5,919	Faculty/staff survey and Data Digest, 1980
$(CH_S)_S$ =	Number of students' children of school age	1,116	Student survey and University Registrar
CH_S =	Number of school-age children in Virginia	1,186,415	Annual Report of the Superintendent of Public Instruction, 1978-79
Model G-1.5			
	Other University-Related Revenues Collected by the City and County		
$G\text{-}1.5 = G\text{-}1.5.1 + G\text{-}1.5.2 + G\text{-}1.5.3$		$2,567,000	
Model G-1.5.1			
	Auto Registration Fees from University-Related Individuals		
$G\text{-}1.5.1 = (AR)(A_F + A_S)$		$200,000	
AR =	Auto registration fee	$15	Department of Motor Vehicles
A_F =	Number of faculty and staff cars	7,397	Director of Parking and Transit
A_S =	Number of students' cars registered in the city or county	5,933	Student survey and University Registrar
Model G-1.5.2			
	City and County Utility Profits and Taxes Allocable to University-Related Households		
$G\text{-}1.5.2 = \left(\frac{U_p}{T_C} \right)(F_L^* + S_L^*)$		$2,190,000	
U_p =	Utility profits and taxes--city	$2,400,000	City and county budgets
	--county	$1,950,000	
T_C =	Number of households in the city or county--city	16,308	U.S. Bureau of the Census, 1980 Advance Counts
	--county	20,053	

Variable	Description	Value	Source
F_L* =	Number of faculty and staff residing in nonuniversity housing in the city or county	6,889	Faculty/staff survey and Data Digest, 1980
S_L* =	Number of student households in nonuniversity housing in the city or county	11,414	Student survey and University Registrar

Model G-1.5.3

Direct Payments to the City and County by the University	--city	$67,000	University Comptroller
	--county	$110,000	

Model G-2

Operating Cost of City and County Provided Services and Public Schools Allocable to University-Related Influences

$G\text{-}2 = G\text{-}2.1 + G\text{-}2.2$ $15,722,000

Model G-2.1

Operating Cost of City and County Provided Services Allocable to University-Related Influences

$$G\text{-}2.1 = \left(\frac{\frac{F + S}{POP_{LD}} + \frac{FH_L + SH_L}{POP_{LR}}}{2} \right) (B_M)$$ $7,063,000

F =	Number of faculty and staff	7,582	Data Digest, 1980
S =	Number of students	16,452	University Registrar
POP_{LD} =	City and county daytime population	101,110	Estimated from Census of Population: 1970 Population Characteristics and 1980 Advance Counts
FH_L =	Number of persons in faculty and staff households residing in the city or county	21,146	Faculty/staff survey and Data Digest, 1980
SH_L =	Number of persons in student households residing in the city or county	35,865	Student survey and University Registrar
POP_{LR} =	Population--city	45,010	U.S. Bureau of the Census, 1980 Advance Counts
	--county	50,689	
B_M =	City and county operating budgets for all municipal services except public schools --city	$11,127,000	City and county budgets
	--county	$5,823,000	

Model G-2.2

Operating Cost of City and County Public Schools Allocable to University-Related Persons

$$G\text{-}2.2 = \left(\frac{(CH_{PS})_F + (CH_{PS})_S}{CH_{PS}} \right) (B_{PS})$$ $8,659,000

Variable		Description	Value	Source
$(CH_{PS})_F$	=	Number of faculty and staff children attending city or county public schools	3,837	Faculty/staff survey and Data Digest, 1980
$(CH_{PS})_S$	=	Number of students' children attending city or county public schools	1,059	Student survey and University Registrar
CH_{PS}	=	Number of children attending city or county public schools--city	5,872	Model G-1.4.1
		--county	10,281	
B_{PS}	=	Operating budgets for public schools--city	$8,894,000	City and county budgets
		--county	$19,674,000	

Model G-3

Value of City and County Properties Allocable to University-Related Portion of Services Provided

$$G\text{-}3 = \left(\frac{G\text{-}2.1}{B_M}\right)(GP_M) + \left(\frac{G\text{-}2.2}{B_{PS}}\right)(GP_{PS})$$ $45,499,000

G-2.1	=	Operating cost of city or county provided municipal services allocable to university-related influences	$8,936,000	Model G-2.1
B_M	=	Operating budgets for all municipal services except public schools--city	$11,127,000	City and county budgets
		--county	$5,823,000	
GP_M	=	Value of all city and county property except public schools--city	$42,531,000	City of Charlottesville Assessor's Office and Albemarle County Real Estate Office
		--county	$18,767,000	
G-2.2	=	Operating cost of city and county public schools allocable to university-related persons	$8,659,000	Model G-2.2
B_{PS}	=	Operating budgets for public schools--city	$8,894,000	City and county budgets
		--county	$19,674,000	
GP_{PS}	=	Value of all city and county property associated with public schools--city	$14,138,000	Annual Report of the Superintendent of Public Instruction
		--county	$29,354,000	

Model G-4

Real Estate Taxes Foregone Through the Tax-Exempt Status of the University

$$G\text{-}4 = \left[R_{RE} - (R_{RE})_C\right]\left(\frac{G_C}{G_L}\right) - (R_{RE})_C$$ $63,000

R_{RE}	=	Total real estate taxes collected--city	$6,841,000	Annual Report, Department of Taxation, 1978-79
		--county	$6,252,000	
$(R_{RE})_C$	=	Real estate taxes paid to city and county by the university	$0	University Comptroller
G_C	=	Geographical area of the university (square miles)	3.6	University Director of Planning
G_L	=	Geographical area of the city and county (square miles)--city	10	Annual Report, Department of Taxation, 1978-79
		--county	741	

Variable	Description	Value	Source
Model G-5			
Value of Municipal-Type Services Self-Provided by the University			
G-5	= Police and security services, sanitation, street lighting and maintenance, and other services	$550,000	University Business Manager

INDIVIDUAL MODELS

Variable	Description	Value	Source
Model I-1			
Number of Jobs in the City and County Attributable to the Presence of the University			
$I\text{-}1 = F + (j)(B\text{-}1.1 + G\text{-}2)$		22,882	
F =	Number of faculty and staff	7,582	Data Digest, 1980
j =	Full-time jobs per dollar of direct expenditures in the local environment	0.00008	Caffrey-Isaacs
$B\text{-}1.1$ =	University-related city and county expenditures	$175,532,000	Model B-1.1
$G\text{-}2$ =	Operating cost of city and county provided services and public schools allocable to university-related influences	$15,722,000	Model G-2
Model I-2			
Personal Income of Individuals Residing in the City and County from University-Related Jobs and Business Activities			
$I\text{-}2 = (f_L)(W_F) + (p)(B\text{-}1.1)$		$230,864,000	
f_L =	Proportion of faculty and staff residing in the city and county	0.86	Faculty/staff survey
W_F =	Gross compensation to faculty and staff	$133,736,000	University Comptroller
p =	Payrolls and after tax profits per dollar of local direct expenditure	0.66	Caffrey-Isaacs
$B\text{-}1.1$ =	University-related city and county expenditures	$175,532,000	Model B-1.1
Model I-3			
Durable Goods Procured with Income from University-Related Jobs and Business Activities			
$I\text{-}3 = (i)(I\text{-}2)$		$16,160,000	
i =	Proportion of total income typically used to purchase durable goods	0.07	Autumn 1979 Urban Family Budgets and Comparative Indexes for Selected Urban Areas, United States Department of Labor
$I\text{-}2$ =	Personal income of individuals residing in the city and county from university-related jobs and business activities	$230,864,000	Model I-2

Appendix B. Methodology

In this section of the report, the procedure used to determine the University's economic impact is documented by explaining the methodology used to supplement or to verify figures used in the Caffrey-Isaacs model. In the Caffrey-Isaacs model, an attempt is made to estimate how spending circulates through an economy by using an adaptation of the multiplier concept.

Multiplier Concept

The multiplier concept was popularized as a result of the work of the well-known British economist, John Maynard Keynes. In Keynesian analysis, the multiplier is usually applied to an entire economy, such as a country or nation, and is based on estimates of how individuals in that economy, as a group, will allocate their after-tax income between savings and spending for consumption. The multiplier is used to estimate the amount by which an expenditure will affect the economy by an amount greater than the original expenditure because of the circular flow of income.

If, for example, an individual receives $100 of income, of which $20 is paid in income taxes and $10 is saved, this leaves $70 to spend. The businesses receiving these $70 use their receipts to pay expenses including wages of their employees, as well as to replenish their inventories. So a portion of the initial $70 spent finds its way back into the income stream through the payroll expenditures. The process continues as the second and subsequent rounds of income recipients spend a portion of

their income.

In this study, it was important to estimate not only how much of individual incomes were paid out in income taxes, but also how individuals allocated their after-tax income between savings and spending for consumption. It was also important to know how much of the consumption spending was done locally and how much was done outside the study area. In addition, patterns of business spending were important. That is, it was desirable to know how local business receipts were allocated among local, federal, and state taxes, wages and salaries, local suppliers and out-of-area suppliers, and other expenses.

The rationale behind the methodology of the multiplier can be summarized as follows: the University spent its funds for wages and salaries and supplies. The wage and salary component of University expenditures that was paid to area residents represents a direct impact of the University on local income. The University also bought a portion of its supplies locally. This spending represents a direct impact on area business sales.

In addition, local suppliers of the University hired employees to handle the business directly generated by the University and in addition, they bought some of their supplies locally. These two expenditures represent part of the indirect impact of the University on the community. However, probably the most significant portion of the indirect effect was represented by the spending of University employees. A large fraction of the incomes of University faculty and staff was spent locally. As a result, business sales were higher, and hence the businesses bought additional supplies and hired employees to service the needs of University faculty and staff.

The usual multiplier formula is as follows:

$$\text{Multiplier} = \frac{1}{1 - \text{Marginal Propensity to Consume}}$$

This formula says that the larger the propensity for an individual to consume, the greater will be the impact on income. For example, if the Marginal Propensity to Consume were 0.75, the multiplier would be $\frac{1}{1 - 0.75} = \frac{1}{0.25} = 4$. This would mean that an increase in income of $100 would lead to an ultimate increase in income of $400 after the spending had worked its way through the various rounds.

For this study, however, it was deemed important to modify the multiplier formula, because it was originally developed for a more closed economic system than the one considered here. Hence, for the Charlottesville-Albemarle area, the multiplier is considered to be as follows:

$$\text{Multiplier} = 1 \div [1 - \text{proportion of personal income spent in the local area } (1 - \text{proportion of business spending going out of the area})]^{1}$$

Within this framework, it was necessary to estimate the values for several of the variables involved.

Gravity Model

In calculating the average percentage of personal income spent in the local area, the first problem was to estimate the amount of spending which went outside Charlottesville and Albemarle. This was done by using a gravity model.[2] The gravity model was based on the theory that the amount of money spent for nonhousing expenditures is inversely proportion-

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[1] A further modification of the usual multiplier formula should also be noted. Whereas, marginal propensities would be desired, this study was constrained to the use of average propensities as the most readily available data.

[2] Caffrey and Isaacs, Estimating the Impact of a College or University on the Local Economy, p. 46.

al to the square of the distance to the point of purchase. Areas with retail drawing power were used in the gravity model. The equation for this computation is:

$$e_L = \frac{\frac{RS_L}{D_L^2}}{\frac{RS_L}{D_L^2} + \frac{RS_{N1}}{D_{N1}^2} + \frac{RS_{N2}}{D_{N2}^2} + \ldots + \frac{RS_{Nn}}{D_{Nn}^2}}$$

e_L = proportion of nonhousing expenditures made locally

RS_L = total retail sales of the local area

D_L = average distance a person travels for a local purchase

RS_{Nn} = total retail sales in the n^{th} competing community

D_{Nn} = average distance a personal travels for a purchase in the n^{th} competing community

	Retail Sales[1] (in millions)	Average Distance from Charlottesville-Albemarle
Charlottesville-Albemarle County	$ 426.027	5 miles
Waynesboro-Staunton-Augusta County	306.815	30 miles
Lynchburg area	573.959	65 miles
Richmond area	2,927.109	70 miles
Washington, D.C. area	15,276.000	115 miles

[1]May, E. G., Retail Sales in Virginia, 1980, Tayloe Murphy Institute, University of Virginia, 1981.

U.S. Bureau of the Census, Current Business Reports - Monthly Retail Trade, January 1980.

$$e_L = \frac{\frac{426}{5^2}}{\frac{426}{5^2} + \frac{307}{30^2} + \frac{574}{65^2} + \frac{2,927}{70^2} + \frac{15,276}{115^2}}$$

$$e_L = \frac{17.041}{17.041 + 0.341 + 0.136 + 0.597 + 1.155}$$

$$e_L = \frac{17.041}{19.270}$$

$$e_L = 0.884$$

Multiplier Calculation

Next, using data from the Department of Commerce[1] on personal consumption expenditures, typical expenditure of a dollar income was determined such that the proportion of dollars spent locally represented an after tax and after savings figure.

(Income) (1 - Effective Tax Rate) = (Disposable Personal Income)

(1.00)(1 - 0.155) = (0.845)

(Disposable Personal Income) - (Savings) = (Personal Consumption)

(0.845) - (0.044) = (0.801)

(Personal Consumption)(Proportion of Faculty and Staff Living Locally) = (Total Local Expenditures)

(0.801)(0.86) = (0.689)

The next step was to determine what proportion of business expenditures occurred outside the area. This figure was derived from the business survey and data on business volume.[2] According to the survey of

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[1]U. S. Department of Commerce, Survey of Current Business, December 1980.

[2]U.S. Bureau of the Census, Census of Business, 1977, Retail Trade: Virginia, RC77-A-47.

Internal Revenue Service, Statistics of Income - 1974, Corporate Income Tax Returns.

Charlottesville and Albemarle businesses, 31% of total revenues were estimated to be for business purchases in the local area.

Of the sales dollars an estimated 33% was spent locally for business operations and 67% flowed outside the area for purchases and nonlocal taxes. To yield the net outflow from the area, 2% was assumed for return of tax monies to the area in the form of transfers. Therefore, the final outflow from the area was determined to be 65% of each sales dollar.

By substituting these figures in the multiplier formula, a figure of 1.317 was obtained.

$$\text{Multiplier} = \frac{1}{1 - (MPC_1)(1 - L)}$$

MPC_1 = Propensity to spend locally

L = Leakage of spending outside the area

$$\text{Multiplier} = \frac{1}{1 - (0.689)(1 - 0.65)}$$

Multiplier = 1.317

Employment Multiplier

Besides the 7,582 faculty and staff positions (fulltime equivalent) at the University in the fiscal year 1979-1980, a significant portion of the Charlottesville-Albemarle employment was indirectly the result of the University. Through the purchase of goods and services, the University and its employees created nonuniversity employment in the area. This non-university employment in turn created jobs for other people, further increasing employment. Thus one job provided the stimulus for a number of additional jobs. The figure, which through its use the number of additional jobs is estimated, is called the employment multiplier.

The size of the employment multiplier depends on two dimensions: whether the markets the employers serve are externally or internally

oriented, and the population of the surrounding community. Businesses which serve local residents by providing services or goods, such as dry cleaning or food, are considered to be internally oriented. Those firms, however, that serve needs outside the community by manufacturing such products as frozen foods or telephones, are classified as externally oriented.

Employment in the external sector has more effect on the community than does employment in the internal sector because external-sector employment produces more additional internal employment than does internal-sector employment. For example, if a factory is started, external employment increases. In response to this new employment, more stores open to service the needs of the people employed by the factory; thus both external and internal employment increases from the new stimulus.

On the other hand, a new retail store frequently will not increase total employment because some other store may lose business and thus reduce its employment (assuming the total amount of money spent in the area remains stable). Those companies which produce goods or services for consumption outside the area tend to provide more employment and income to the area than do companies providing goods and services for local consumption.

The University provides external employment because its product, education, is generally purchased by persons from outside the geographic area. That is, most of the University students come from other than the city of Charlottesville and Albemarle County. Thus, one University employee creates greater indirect employment for the area than does one employee in a retail store. The same is true for major other "exporting" companies in the area, such as General Electric, Morton Frozen Foods,

Sperry Rand, State Farm Insurance, Stromberg-Carlson, and Teledyne Avionics.

The population of the community involved also has an effect on the size of the employment multiplier. The Caffrey-Isaacs model suggests an employment multiplier between 1.2 and 1.5 for an area with a population of about 50,000.[1] A figure at the higher end of the range appears to be reasonable for Charlottesville-Albemarle for several reasons. First, the nonstudent population of Charlottesville and Albemarle, 80,300,[2] is higher than the 50,000 example given by Caffrey-Isaacs. Because an area with a larger population tends to provide a higher proportion of its own needs from within the area, a higher multiplier is appropriate. Second, with a high proportion of people in external employment, a higher demand for internal services usually results, thus increasing total employment. Therefore, external employment for Charlottesville-Albemarle was estimated to be about 16% versus 4% in the Caffrey-Isaacs model.

Third, the city used in the Caffrey-Isaacs model was a suburban area with the college-related business consisting mostly of retail and personal services. As such, much of the college's economic dependence was on other communities. In contrast, Charlottesville-Albemarle is an area which is relatively self-sustaining. A more self-sufficient area uses a higher multiplier, because employment increases in the area tend to regenerate themselves locally.

Thus, an employment multiplier of 1.5 was selected for the Charlottesville-Albemarle study. As a result of this, area employment

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[1] Caffrey and Isaacs, Estimating the Impact of a College or University on the Local Economy, p. 44.

[2] Bureau of the Census, "Advance Counts, 1980 Census," U.S. Government, Washington, D.C.

attributable to the University faculty and staff was 18,955 jobs. This figure, however, does not include the multiplier effects of the 2,032 students who are part-time employees of the school. Assuming that the typical part-time student averaged 15 hours of work per week, the multiplier effect would result in 1,143 additional jobs:

$$(2{,}032)\left(\frac{15}{40}\right)(1.5) = 1{,}143$$

Thus, the total area employment created by the University was 22,130 positions, which represents 42% of the total Charlottesville-Albemarle nonagricultural employment, estimated to be 52,790.[1]

	Direct Employment	Additional Through Multiplier	Total
Faculty and staff	7,582	11,373	18,955
Students (part-time)	2,032	1,143	3,175
Total	9,614	12,516	22,130

As shown in the example below, the figure 22,130 jobs is in line with the figure produced using the Caffrey-Isaacs approach which suggests that each dollar of local expenditures, in this case $191 million, results in 0.00008 jobs.

$$\frac{22{,}130}{191{,}000{,}000} = 0.00016$$

[1] Virginia Employment Commission, Labor Market Trends, Charlottesville, Virginia, V. 26, N. 1, January 1981.

Appendix C.
Survey Methods and Findings

In order to acquire the needed data for this project, surveys of several local groups were conducted. Data available from the Caffrey-Isaacs models, based on national samples, were used as guidelines; however, local data were gathered and used in the Charlottesville-Albemarle study.

During the fall of 1980, surveys were developed and distributed to samples of the following four groups: faculty and staff, students, fraternities and sororities, and businesses. These surveys were developed to produce data for the Caffrey-Isaacs model. In addition to these mail surveys, a telephone survey of a sample of residents of Charlottesville and Albemarle was conducted in early December 1980. Further details on these surveys follow below.

Faculty and Staff Survey

The questionnaire for the faculty and staff was distributed to a sample of 10% of the 8,010 full- and part-time University employees. (See Exhibit 8.) Of the 809 questionnaires, a total of 284 responses were returned, amounting to a 35% response rate.

The questionnaires were coded and tabulated using the Statistical Package for the Social Sciences (SPSS) program on the University computing system. The results of the faculty/staff survey are shown in Exhibits 9, 10, and 11.

Student Survey

As with the faculty/staff survey, a 10% sample of names of the 16,452 full- and part-time students was drawn and questionnaires were mailed to 1,650 students. (See Exhibit 12.) Of these questionnaires mailed, over 900 responses or 55% were returned. Again the questionnaires were coded and tabulated using SPSS. The results of the student survey are shown in Exhibits 13, 14, and 15.

Business Survey

The business questionnaire was mailed to 634 business addresses obtained from the Charlottesville and Albemarle County Chamber of Commerce. (See Exhibit 16.) Fifty-six percent, or 357 responses were returned; the returns were tabulated also using SPSS. The results of the business survey are shown in Exhibits 4 and 17.

Residents Survey

A total of 1,800 phone numbers were chosen at random from the Charlottesville area phone book. For seven continuous week nights, between 6:00 and 9:00 p.m., these numbers were called until 600 responses were obtained. The results of this survey are shown in Exhibits 5, 6, and 7.

Exhibit 8

SURVEY INSTRUMENT USED WITH UNIVERSITY FACULTY AND STAFF

CONFIDENTIAL

UNIVERSITY OF VIRGINIA
THE COLGATE DARDEN GRADUATE SCHOOL OF BUSINESS ADMINISTRATION
Tayloe Murphy Institute

UNIVERSITY OF VIRGINIA IMPACT STUDY

1. **What is your position with the University?**
   - ☐ Faculty
   - ☐ Faculty/Administration
   - ☐ Staff

2. **Where are you employed?**
   - ☐ Medical Center
   - ☐ Other University

3. **What is your sex?**
   - ☐ Male
   - ☐ Female

4. **What is your marital status?**
   - ☐ Single
   - ☐ Married
   - ☐ Other

5. **How many persons are there in your household?** (Including yourself)
   - ___ Total
   - ___ Number of children 18 or younger
   - ___ Number of these attending public school (K-12)

6. **How many people in your household are employed by the University?** ___

7. **Where is your residence?**
   - ☐ Charlottesville
   - ☐ Albemarle County
   - ☐ University housing
   - ☐ Other (please specify: _____)

Over

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8. In what type of housing do you reside?

- ☐ Rented apartment or house
- ☐ Own house or condominium
- ☐ Other (please specify: _____)

9. Please estimate your average monthly expenditures in the Charlottesville-Albemarle area to University and non-University sources:

	University	Non-University	Total
Housing (rent or mortgage, taxes, utilities, insurance)	$_____	$_____	$_____
Food	$_____	$_____	$_____
All Other (e.g., entertainment, clothing, health care, transportation, tuition)	$_____	$_____	$_____
Total	$_____	$_____	$_____

10. What is your annual income for calendar year 1980?

- $_____ Total income from all sources for all members of your household
- $_____ Total University income (before deductions) for all household members
- $_____ Net University income (after deductions) for all household members

11. What is your average monthly balance in Charlottesville and/or Albemarle County financial institutions?

- $_____ Bank checking accounts
- $_____ Bank savings accounts
- $_____ Credit union savings
- $_____ Savings and loan accounts

12. How many non-local people (parents, relatives, friends, etc.) visited you last year? Each visit should be counted separately for those people who visited more than once. (If this is your first year at the University, please answer these questions using an estimate of how many visitors you expect this year.)

____ visitors

Please estimate the average length of stay of each visitor:

____ days

Please estimate the average daily expenditures in the Charlottesville-Albemarle area by each visitor during each visit:

$_____ per day

Tayloe Murphy Institute, Box 6550, Charlottesville, VA 22906

Exhibit 9

PROFILE OF RESPONDENTS TO FACULTY/STAFF SURVEY

	Where Employed		
	Medical Center	Other	Total
Classification:			
Administration	5	13	18
Faculty	35	53	88
Staff	108	67	175
Total	148	133	281

	Place of Residence				
	University Housing	Charlottes-ville	Albemarle	Other	Total
Type of Residence:					
Rent	10	49	44	4	107
Own	0	65	81	20	166
Other	1	1	5	3	10
Total	11	115	130	27	283

	Average Size of Household		Average Number of School Age Children, of Those with Children		Average Number Of Children in Public Schools, of Those with Children	
Marital Status:						
Single	1.7	(82)*	**	(5)	**	(4)
Married	3.2	(174)	1.9	(91)	1.8	(59)
Other	2.1	(28)	1.6	(15)	**	(9)
Total	2.6	(284)	1.8	(111)	1.8	(72)

*Number of people reporting.
**Data withheld because of small sample.

Exhibit 10

TYPICAL ANNUAL EXPENDITURES OF RESPONDENTS TO FACULTY/STAFF SURVEY

	Number of Respondents	Type of Expenditure					
		University			Nonuniversity		
		Housing	Food	Other	Housing	Food	Other
Total	284	$ 369	$ 132	$ 329	$4,011	$2,496	$3,789
Place of Employment:							
Medical Center	147	$ 434	$ 140	$ 343	$3,637	$2,328	$3,370
Other University	129	295	123	313	4,001	2,688	4,272
Classification:							
Administration	18	$ 537	$ 107	$ 42	$4,455	$3,637	$5,636
Faculty	86	491	150	321	5,328	3,381	5,790
Staff	171	292	126	361	3,318	1,946	2,619
Marital Status:							
Single	80	$ 312	$ 173	$ 299	$2,749	$1,334	$2,292
Married	170	410	111	388	4,726	3,106	4,637
Other	27	264	142	32	3,237	2,091	2,730
Place of Residence:							
Charlottesville	110	$ 381	$ 133	$ 308	$4,184	$2,207	$3,688
Albemarle	130	323	134	312	4,936	2,769	4,395
University Housing	11	1,615	153	1,260	496	3,813	2,928
Other	26	-	118	93	129	1,779	1,465
Type of Housing:							
Rented	105	$ 262	$ 131	$ 326	$3,039	$1,806	$2,211
Owned	162	440	122	316	4,843	2,942	4,837
Other	10	304	307	540	706	2,448	2,922

Exhibit 11

AVERAGE ACCOUNT BALANCES REPORTED BY RESPONDENTS TO FACULTY/STAFF SURVEY
(Number of People Reporting Having Accounts)

	Number of Respondents	Checking	Savings	Credit Union	Savings and Loan
Total	284	$ 647 (256)	$2,118 (134)	$1,997 (141)	$5,527 (60)
Place of Employment:					
Medical Center	145	$ 584 (138)	$2,008 (62)	$2,193 (85)	$6,743 (31)
Other University	125	726 (117)	2,188 (71)	1,727 (55)	4,227 (29)
Position:					
Administration	17	$1,246 (16)	$5,372 (11)	* (8)	* (5)
Faculty	86	1,044 (85)	1,950 (40)	$2,687 (38)	$6,586 (21)
Staff	166	366 (154)	1,784 (82)	1,641 (95)	4,950 (34)
Marital Status:					
Single	77	$ 453 (72)	$ 894 (40)	$1,566 (41)	$2,746 (12)
Married	168	794 (157)	2,916 (80)	2,316 (87)	4,520 (43)
Other	26	310 (27)	1,060 (14)	1,226 (13)	* (5)
Place of Residence:					
Charlottesville	106	$ 629 (108)	$2,047 (65)	$1,395 (60)	$5,844 (32)
Albemarle	128	687 (122)	2,227 (58)	2,534 (66)	5,892 (23)
University Housing	11	665 (10)	* (5)	* (4)	* (1)
Other	26	447 (16)	* (6)	2,351 (11)	* (4)
Type of Housing:					
Rented	101	$ 386 (99)	$1,077 (58)	$2,475 (51)	$8,600 (12)
Owned	161	850 (148)	3,033 (73)	1,848 (84)	5,053 (45)
Other	9	* (8)	* (2)	* (5)	* (2)

*Data withheld because of small sample.

Exhibit 12

SURVEY INSTRUMENT USED WITH UNIVERSITY STUDENTS

CONFIDENTIAL

UNIVERSITY OF VIRGINIA
THE COLGATE DARDEN GRADUATE SCHOOL OF BUSINESS ADMINISTRATION
Tayloe Murphy Institute

UNIVERSITY OF VIRGINIA IMPACT STUDY

1. **Please indicate your status at the University:**
   - ☐ Undergraduate
   - ☐ Graduate
   - ☐ Other (please specify: _____)

   If graduate, is enrollment for:
   - ☐ 9 months
   - ☐ 12 months
   - ☐ Other (please specify: _____)

2. **What is your sex?** ☐ Male ☐ Female

3. **What is your marital status?** ☐ Single ☐ Married ☐ Other

4. **How many persons are there in your household?** (Do not include parents' family) _____

5. **How many people in your household are employed by the University?** _____

6. **Where is your usual residence while attending the University of Virginia?**
   - ☐ University housing
   - ☐ Charlottesville
   - ☐ Albemarle County
   - ☐ Other (please specify: _____)

   If on 9-month enrollment, where is your summer residence?
   - ☐ University housing
   - ☐ Charlottesville
   - ☐ Albemarle County
   - ☐ Other (please specify: _____)

7. **In what type of housing do you reside while attending the University?**
   - ☐ University housing
   - ☐ Fraternity/Sorority
   - ☐ Rented apartment or house
   - ☐ Own house or condominium
   - ☐ With parents
   - ☐ Other (please specify: _____)

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8. Please estimate your average monthly expenditures in the Charlottesville-Albemarle area to University and non-University source:

	University	Non-University	Total
Housing (rent or mortgage, taxes, utilities, & insurance)	$_____	$_____	$_____
Food	$_____	$_____	$_____
All other (e.g., entertainment, clothing, subscriptions, health care)	$_____	$_____	$_____
Total	$_____	$_____	$_____

9. What is your average monthly balance in Charlottesville and/or Albemarle County financial institutions?

$_____ Bank checking accounts
$_____ Bank savings accounts
$_____ Credit union savings
$_____ Savings and loan accounts

10. How many non-local people (parents, relatives, friends, etc.) visited you last year? Each visit should be counted separately for those people who visited more than once. (If this is your first year at the University, please answer these questions using an estimate of how many visitors you expect this year.)

_____ visitors

Please estimate the average length of stay of each visitor:

_____ days

Please estimate the average daily expenditures in the Charlottesville-Albemarle area by each visitor during each visit:

$_____ per day

11. Do you own a car? ☐ Yes ☐ No

If yes, and if it is registered in Virginia, in which city or county is it registered?

_____

Exhibit 13

PROFILE OF RESPONDENTS TO STUDENT SURVEY

	Status at University			
	Under-graduate	Graduate	Other	Total
Total.....	608	290	10	908
Sex:				
Male.....	292	187	5	484
Female.....	315	100	5	420
Marital Status:				
Single.....	594	183	4	781
Married.....	13	96	6	115
Other.....	1	9	-	10

	Place of Residence				
	University Housing	Charlottes-ville	Albemarle	Other	Total
Type of Residence:					
University Housing..	254	2	0	0	256
Fraternity/Sorority.	1	51	1	0	53
Rent.....	3	432	100	5	540
Own.....	0	19	14	13	46
With Parents.....	0	1	1	0	2
Total	258	505	116	18	897

	Average Size of Household		Average Number of School Age Children, of Those with Children		Average Number of Children in Public Schools, of Those with Children	
Marital Status:						
Single.....	2.1	(781)*	-	(0)	-	(0)
Married.....	2.6	(114)	1.4	(41)	1.4	(39)
Other.....	1.4	(13)	**	(5)	**	(4)
Total.....	2.2	(908)	1.4	(46)	1.4	(43)

*Number of people reporting.
**Data withheld because of small sample.

Exhibit 14

TYPICAL ANNUAL EXPENDITURES OF RESPONDENTS TO STUDENT SURVEY

	Number of Respondents	Type of Expenditure					
		University			Nonuniversity		
		Housing	Food	Other	Housing	Food	Other
Total	908	$ 311	$ 250	$ 111	$1,358	$ 970	$ 861
Sex:							
Male	484	$ 280	$ 264	$ 101	$1,523	$1,103	$ 940
Female	420	349	236	124	1,169	813	768
University Status:							
Undergraduate	608	$ 350	$ 334	$ 114	$ 906	$ 693	$ 602
Graduate	290	227	81	103	2,274	1,541	1,392
Other	10	258	18	182	2,337	1,302	1,211
Marital Status:							
Single	781	$ 288	$ 284	$ 119	$1,141	$ 795	$ 685
Married	115	482	44	67	2,814	1,429	2,016
Other	10	99	119	88	1,885	1,329	1,322
Residence:							
University Housing	258	$1,039	$ 639	$ 213	*	$ 556	$ 550
Charlottesville	508	31	110	73	$1,729	1,046	864
Albemarle	116	*	57	78	2,875	1,684	1,593
Other	26	-	28	14	92	368	584
Type of Housing:							
University Housing	256	$1,319	$ 644	$ 214	$ 41	$ 559	$ 559
Fraternity/Sorority	53	48	104	55	895	1,017	743
Rent	540	19	103	72	1,882	1,075	924
Own	46	-	40	59	3,421	2,082	2,023
With Parents	2	*	*	*	*	*	*

*Data withheld because of small sample.

Exhibit 15

AVERAGE ACCOUNT BALANCES REPORTED BY RESPONDENTS TO STUDENT SURVEY
(Number of People Reporting Having Accounts)

	Number of Respondents	Checking	Savings	Credit Union	Savings and Loan
Total	908	$ 358 (597)	$1,585 (163)	$1,435 (23)	$4,548 (29)
Sex:					
Male	484	$ 433 (319)	$1,997 (87)	$1,628 (12)	$6,911 (16)
Female	420	269 (278)	1,113 (76)	1,225 (11)	1,639 (13)
University Status:					
Undergraduate	608	$ 279 (363)	$ 790 (111)	$1,008 (12)	$2,028 (15)
Graduate	290	491 (225)	3,140 (51)	2,071 (10)	6,426 (14)
Other	10	* (9)	* (1)	* (1)	- (0)
Marital Status:					
Single	781	$ 320 (503)	$1,100 (139)	$1,259 (16)	$2,212 (24)
Married	115	581 (87)	4,191 (23)	* (6)	* (5)
Other	10	* (7)	* (1)	* (1)	- (0)
Residence:					
University Housing	258	$ 333 (159)	$ 836 (50)	* (5)	* (4)
Charlottesville	508	355 (348)	1,768 (87)	$ 370 (15)	$4,059 (17)
Albemarle	116	416 (85)	2,369 (24)	* (3)	* (8)
Other	26	* (5)	* (2)	- (0)	- (0)
Type of Housing:					
University Housing	256	$ 332 (160)	$ 959 (49)	* (5)	* (4)
Fraternity/Sorority	53	359 (34)	476 (10)	- (0)	- (0)
Rent	540	340 (368)	1,751 (96)	$1,115 (15)	$3,963 (23)
Own	46	736 (29)	* (5)	* (3)	* (2)
With Parents	2	* (2)	* (1)	- (0)	- (0)

*Data withheld because of small sample.

Exhibit 16

SURVEY INSTRUMENT USED WITH CHARLOTTESVILLE-ALBEMARLE BUSINESSES

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UNIVERSITY OF VIRGINIA
THE COLGATE DARDEN GRADUATE SCHOOL OF BUSINESS ADMINISTRATION
Tayloe Murphy Institute

UNIVERSITY OF VIRGINIA IMPACT STUDY

1. **What is the principle function of your firm?**
   - ☐ Manufacturer
   - ☐ Wholesaler
   - ☐ Retailer
   - ☐ Service
   - ☐ Other (please specify: _____)

2. **How many people do you employ?**
   - _____ Full time
   - _____ Part time

3. **What percent of your total employees reside in Charlottesville or Albemarle County? (If unknown, please estimate.)**
   - _____ percent

4. **What are your yearly gross sales / billings / revenues?** $_____

5. **Approximately what percent of your total procurements (supplies, inventory, utilities, resale items, etc.) are purchased from firms operating in Charlottesville or Albemarle County?**
   - _____ percent

6. **Please estimate (even very roughly) what percent of your business you attribute to the University and its faculty, staff, and students. If you have no data on this figure, please give your best estimate:**
   - _____ percent

7. **Did the University influence you to locate your business in the Charlottesville-Albemarle area?**
   - ☐ Major influence
   - ☐ Minor influence
   - ☐ No influence

Over

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8. Please indicate the extent to which your firm uses the following University facilities and services:

	Extensively	Frequently	Occasionally	Never
Educational services (e.g., courses, continuing education, lectures, management training)	☐	☐	☐	☐
Research services (e.g., libraries, scientific research, consultations, publications)	☐	☐	☐	☐
Community services (e.g., medical and health services, career placement, student employment)	☐	☐	☐	☐
Public events (e.g., cultural, athletic, social)	☐	☐	☐	☐

Tayloe Murphy Institute, Box 6550, Charlottesville, VA 22906

Exhibit 17

BUSINESS SURVEY RESULTS

Number of Respondents	357
Number of Employees:	
Total for Respondents	15,531
Average per Respondent	44
Estimated Number of Employees Living in Charlottesville or Albemarle	
Total for Respondents	13,201
Average per Respondent	37
Estimated Proportion of Expenditures to be within the Charlottesville or Albemarle Area	46%
Proportion of Business Judged to be with the University	19%
Influence of University on Decision to Locate Business in Charlottesville or Albemarle	
Major	25%
Minor	25
None	50
	100%

TAYLOE MURPHY INSTITUTE
Dynamics Building, 4th Floor
2015 Ivy Road
Charlottesville, Virginia 22903

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