

THE ECONOMIC IMPACT OF THE UNIVERSITY OF VIRGINIA

HOW A MAJOR RESEARCH UNIVERSITY
AFFECTS THE LOCAL AND STATE ECONOMIES

BASED ON 2005 DATA

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University of Virginia

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TABLE OF CONTENTS

LIST OF TABLES AND FIGURES	v
FOREWORD	vii
STUDY HIGHLIGHTS	1
CHAPTER 1 THE STUDY IN BRIEF: OVERVIEW AND SUMMARY	5
INTRODUCTION	5
LOCAL AREA	5
Local Spending	5
Spending by the University and Its Major Components	5
Spending by Students	6
Visitor Spending	6
Total Local Spending Attributable to the University	6
University Employment	7
University Involvement in Community Services	7
Police	7
Fire	7
Emergency Communications	7
Rescue	7
University Transit Service	8
Student Housing Inspection	8
Solid Waste Disposal	8
Charitable Activities	8
Medical Center Programs	8
The University and Local Government Finances	9
Tax-Exempt Real Property	9
Taxable Real Property	9
Service Charges	9
Real Estate Taxes Paid by Faculty, Staff, and Students and Education Services Received	9
STATEWIDE IMPACT	9
The Flow of Dollars into the State	9
Valuing the Outputs of the “Knowledge Factory”	10
Education: The Private Value	10
Education: The Public Value	10
Social Gains	11
Economic Gains	11
Equal Economic Opportunity	11
The Value of University Research	12
Research and Growth	12
U.Va. Initiatives	13
Research and Education as Joint Products	14
CHAPTER 2 A DETAILED ANALYSIS OF THE UNIVERSITY’S LOCAL IMPACT	15
INTRODUCTION	15
LOCAL SPENDING BY THE UNIVERSITY AND BY FACULTY AND STAFF	15
LOCAL SPENDING BY STUDENTS	16
VISITOR SPENDING	18
Faculty and Staff Visitors	19
Students’ Visitors	20
Season Ticket Holders	20
Conference Attendees	21
Alumni Association Visitors	21
Attendees at Office of Admission Events	22
Medical Center Out-of-Town Patients and Their Families	22

Table of Contents Continued

Darden Executive Education Participants	23
Continuing Medical Education Participants.	23
Festival Attendees	23
Virginia Festival of the Book.	23
Virginia Film Festival	24
School of Continuing and Professional Studies Executive Development Program Participants	24
John Paul Jones Arena Spectators	24
Culbreth Theater Patrons.	24
Visitor Summary	24
UNIVERSITY CAPITAL OUTLAY	25
TOTAL LOCAL SPENDING ATTRIBUTABLE TO THE UNIVERSITY	27
University Employment	27
UNIVERSITY INVOLVEMENT IN COMMUNITY SERVICES.	28
Police	28
Fire	29
Emergency Communications.	29
Rescue.	30
University Transit Service	30
Student Housing Inspection	31
Solid Waste Disposal.	31
Charitable Activities	32
Medical Center Programs	32
The University and Local Government Finances	33
Tax-Exempt Real Property.	33
Taxable Real Property	34
Service Charges	35
Real Estate Taxes Paid by University Faculty, Staff, and Students and Public Education Services Received	35
CHAPTER 3 THE ECONOMIC VALUE OF EDUCATION AND RESEARCH.	37
INTRODUCTION	37
A SHORT NOTE ABOUT THE HISTORY OF HIGHER EDUCATION IN AMERICA.	37
THE FLOW OF DOLLARS INTO THE STATE.	38
VALUING OUTPUTS OF THE “KNOWLEDGE FACTORY”	39
THE VALUE OF A UNIVERSITY EDUCATION	39
Education: The Private Value.	41
Increased Wages	41
Benefits Other Than Increased Wage Rates	42
Education: The Public Value	44
Social Gains	44
Economic Gains	44
Equalizing Economic Opportunity	46
THE VALUE OF UNIVERSITY RESEARCH	50
University Research and Economic Growth	50
U.Va. Research Initiatives	52
RESEARCH AND EDUCATION AS JOINT PRODUCTS	54
INSTITUTIONAL INCENTIVES AND FUTURE ECONOMIC GROWTH	55
APPENDIX A ACKNOWLEDGMENTS.	57
APPENDIX B FACULTY AND STAFF SURVEY FORM	61
APPENDIX C STUDENT SURVEY FORM	63
APPENDIX D SEASON TICKET HOLDER SURVEY FORM	67
APPENDIX E REFERENCES	69

LIST OF TABLES AND FIGURES

TABLES

2.1	Population of the Charlottesville MSA, 2005	15
2.2	Local Spending by the University and Its Major Component Units, 2005	16
2.3	Monthly Student Expenditures in the MSA, 2005	17
2.4	Total Local Expenditures of Students Living in the MSA, 2005	18
2.5	Information about Faculty and Staff Visitors, 2005	19
2.6	Monticello Study on Spending per Person per Day	19
2.7	Spending by Visitors of Faculty and Staff, 2005	20
2.8	Information about Students' Visitors from the Student Survey, 2005	20
2.9	Spending by Students' Visitors, 2005	20
2.10	Spending by Non-resident Season Ticket Holders, 2005	20
2.11	Conference Division Programs, Calendar Year 2005.	21
2.12	Alumni Association Out-of-Town Visitors, 2005	22
2.13	Overnight Visitors at Office of Admission Events, 2005	22
2.14	Summary of University Visitors, 2005	25
2.15	Airport Travelers Whose Travel Was U.Va. Connected, 2006	25
2.16	University Capital Construction and Equipment Spending in the Charlottesville MSA, FY 96 to FY 05	26
2.17	University Capital Outlay Plans, 2006 to 2014	26
2.18	University-Related Local Spending by Major Category, 2005	27
2.19	Total Impact of the University in 2005.	27
2.20	University Employment by Place of Work, 2005.	28
2.21	Police Incidents Handled by the Emergency Communications Center, 12 Months Ending September 2005	30
2.22	Patient Loads at the Medical Center, FY 05.	32
2.23	Medical Center Indigent Care, FY 05	33
2.24	Tax-Exempt Property Owned by the University and the University of Virginia Foundation, 2005	34
2.25	Local Real Estate Property Taxes Paid by the University of Virginia Foundation, Tax Year 2005	34
2.26	Service Charges Paid by the University, CY 2005	35
2.27	Real Estate Property Taxes Paid by Faculty, Staff, and Students in Relation to Local Public Education Outlays, 2005	36

FIGURES

1.1	University Visitor Spending, 20056
1.2	Total University-Related Spending, 20056
3.1	U.Va. Non-Tuition Out-of-State Funding and State Appropriations, FY 85 to FY 05	38
3.2	U.Va. In-State Tuition and Fees as a Percentage of Median AGI of Virginia Married Couples, 1973-2003	48
3.3	U.Va. Patent Disclosures and Gross Royalty Income, FY 78 to FY 05.	54

FOREWORD

This study, which was commissioned by U.Va.'s President's Office, is the fourth impact study prepared for the University. The last study was completed in 1990. Since then, enrollment increased by 12.5 percent, two research parks were opened, new classrooms and research facilities were built, new athletic facilities were added and the football stadium was expanded, and full- and part-time salaried employment (Academic Division and the Medical Center) rose by 3,133 (31.8 percent). This new study captures these developments and breaks new ground in terms of methodology and depth, as well as providing a detailed analysis of how a large public research university contributes to the economy of the entire state. Because of changes in scope and methodology, the study is not directly comparable with earlier U.Va. impact studies. Also, unlike earlier efforts, this study examines the role of the University in the state's economy.

The study supplies a reference for discussing University activity by providing common data for the public, the business community, government officials, and the University administration. As much as possible, the study makes use of published information and administrative records. Most of the information is for 2005, the most recent year available in the President's annual report. When estimates are made, they are conservative and are based on surveys, standard economic models and formulas, and the advice of a wide range of experts. Since its inception in 1819 the University has been an integral and major part of the local community. Consequently, any attempt to gauge its full impact is bound to

be incomplete. For example, we were unable to measure the local spending of the many University retirees who reside locally, nor was it possible to measure spending of tourists attracted for multiple reasons, including a visit to see Jefferson's handiwork in designing the original buildings.

It is clear that the economic impact of a school like U.Va. goes far beyond its effects on the immediate University environs. In gauging the statewide effects of the University, the authors reviewed the extensive literature on the economic rationale for state support of a major research university. We use existing studies to suggest the wider impact on the state of a top-ranked education and research program with a strong commitment to public service. Although often difficult to measure with precision for a particular school, evidence strongly suggests that assessing this wider impact should be part of any complete picture of the University's contribution to the Commonwealth.

We wish to acknowledge the many individuals who provided information, some of which was not readily available and required extra time and effort for them to develop. Also, we appreciate the many helpful suggestions for improvement offered by persons who read all or parts of the manuscript. A listing of the individuals who assisted is provided in Appendix A. While we want to give full credit to all of the people who gave assistance, we take complete responsibility for the final product.

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John Knapp is professor emeritus and senior economist at the University's Weldon Cooper Center for Public Service. John has a doctorate in economics from U.Va. as well as an M.A. (economics) from Duke University and a B.A. (economics) from the University of Colorado. He worked full-time at the Cooper Center and its predecessor organization from 1973 to 2005. Since his retirement, he has worked part-time at the Cooper Center. Before joining the University, John worked for the federal government, the Federal Reserve Bank of Richmond, and the Commonwealth of Virginia. During his years in Richmond, John taught economics in the evening program at the University of Richmond. Later, at U.Va., he taught for many years a course in regional economics in the Department of Urban and Environmental Planning. He is a past president of the Council of Professional Associations on Federal Statistics, the Association for University Business and Economic Research, and the Virginia Association of Economists. For many years John served on the Governor's Advisory Board of Economists. His major areas of interest are regional economics and state and local government finance. John was the project director for an earlier study of the University's impact on the Charlottesville metropolitan area that was completed in 1990.

Bill Shobe is the Director of Business and Economic Research at the Weldon Cooper Center for Public Service. He is also adjunct faculty in the Economics Department. Prior to that, Bill was the Associate Director for Economic and Regulatory Analysis with the Virginia Department of Planning and Budget (DPB). At DPB, he had the responsibility for coordinating the agency's expenditure forecasts and the economic impact analysis of regulations. Bill developed the Virginia Regulatory Town Hall web site, the recipient of numerous state and national awards. Bill spent the fall of 2000 in Prague, Czech Republic, on a Fulbright Fellowship in environmental economics and policy. In addition to his responsibilities at DPB, Bill periodically taught classes at Virginia Tech and Virginia Commonwealth University. Before coming to DPB, he taught economics at the University of North Carolina at Greensboro. In 2002, he received a Patrick Henry Award for commitment to effective government. He has had articles published in *Environmental Law*, *Tax Notes*, *Environmental and Resource Economics*, *Virginia Economic Journal*, *Environmental Practice*, and the *Journal of Economic Behavior & Organization*. Bill earned his Ph.D. in economics from the University of Minnesota and received a J.D. from Lewis and Clark Law School.

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STUDY HIGHLIGHTS

LOCAL IMPACT

- Total local spending by all University units, components, employees, students, and visitors was over \$1 billion in 2005. The dollars were spent throughout the Charlottesville metropolitan area, with the major impact in Charlottesville and Albemarle.
- Spending by the University itself in the local economy totaled \$790.6 million in 2005. The Academic Division spent more than three-fifths of this amount. The Medical Center and the closely related Health Services Foundation accounted for another third of local outlays.
- Payroll of faculty and staff living in the Charlottesville Metropolitan Statistical Area (MSA) accounted for 70.6 percent of local spending.
- Spending on facilities, maintenance, and capital outlays for construction accounted for 9.8 percent of local outlays. In FY 05 the share of capital outlays spent locally was \$40.2 million.
- Student spending in the Charlottesville area totaled \$211.9 million in 2005.
- Total spending by all groups of U.Va. visitors was \$122.1 million in 2005. The number of visitor-days was 1.6 million. (The John Paul Jones Arena is not included in the visitor or expenditure estimates because the facility is too new to have sufficient information for analysis.)
- Not all of the \$1,124.5 million that was spent locally stayed in the local economy. But the \$758.4 million that remained locally had multiplier effects, so that the University's total impact still is estimated at \$1,096.6 million in 2005.
- For every dollar spent locally by the University, the ultimate local spending generated by that activity is \$1.45.
- The University is the dominant employer in the Charlottesville metropolitan area. In 2005 the University had 19,487 employees, one-fifth of the area's total non-farm payroll employment of 95,300. The University employs 12,990 full-time and part-time salaried workers, 700 medical residents, and roughly 5,800 hourly workers during the academic year.
- In calendar year 2004 the University's total compensation and benefits expenditure was \$929 million, more than one-fifth of total earnings by place of work in the metropolitan area.
- In addition to being the principal driver of the local economy, the University plays a major role in the local community as a user and, in many cases, as a provider of local services. The University is a major user of local police, fire, and emergency services as well as a generator of municipal waste. The University also serves as an important provider of police, transit, and medical services, and the faculty, staff, and students are involved in numerous charitable activities benefiting the community.
- In FY 05 local outpatients at the U.Va. Medical Center numbered 86,021 and accounted for 45.1 percent of the total number served. People from the metropolitan area accounted for a third of inpatient-days and three-fifths of emergency room visits. In addition, the Medical Center provides a significant amount of indigent care to local residents: \$11.8 million of inpatient care and \$15.8 million of outpatient care were provided.
- Because it is tax-exempt, the University pays no taxes on its academic operations. In 2005 this exemption amounted to \$4.6 million of forgone tax revenue for Charlottesville and \$6.9 million for Albemarle County. The University of Virginia Foundation does not pay taxes on its real estate used for academic purposes. In FY 05 this exemption amounted to forgone taxes of \$69,479 for Charlottesville and \$26,787 for Albemarle County.
- The University of Virginia paid service charges in lieu of a property tax on selected holdings as provided by state law. In 2005 U.Va. paid Charlottesville \$33,158 and Albemarle County \$105,047.
- The University of Virginia Foundation paid 2005 property taxes of \$189,694 to Charlottesville and \$1,149,487 to Albemarle County for its holdings such as the Boar's Head Inn and research

park structures that were not used for academic purposes.

- The total value of taxable real estate owned or rented by faculty, staff, and students was \$3.3 billion in 2005, yielding \$28.3 million in property tax revenue, divided nearly equally between Charlottesville and Albemarle County. In the city, the property tax revenue alone exceeded by \$2.3 million the local cost of educating the children of faculty, staff, and students; but in the county, which has about double the number of public school children attributable to U.Va., property tax revenue was \$7.5 million less than the education cost. If information were available on other taxes paid by faculty, staff, and students and taxes generated by University and visitor spending, the result would likely show that local expenditures related to the University are more than covered by the taxes generated by its presence.

STATEWIDE IMPACT

- In FY 05, U.Va. brought into the state a total of \$456 million in out-of-state grants, giving, and graduate fellowships. The state appropriation from the General Fund for operations at the University amounted to \$132 million in that year. On average, \$1 of state support for the University supports activities which ultimately result in \$3.45 of new spending flowing into Virginia.
- Tuition payments by out-of-state students provided an additional flow of \$166 million into the state in 2005. Patients who come to Virginia for treatment at the Medical Center bring additional funds into the state. Consulting income and honoraria received by University faculty from sources outside of the state add still more.
- As the University's reputation has risen, the net flow of funds into the state has increased dramatically.
- Talented graduate and undergraduate students help draw productive researchers. Each benefits from the presence of the other. Highly trained graduates who choose to live in Virginia provide value in the state economy as workers and leaders. Research creates value in the economy by generating new knowledge that spills over into the local economy as increased productivity and investment.
- The most obvious public economic gain from an individual's decision to attend college is the increase in tax revenues from the individual's higher earnings. Studies show that, for urban areas in particular, the education level of the population affects future growth rates in the area. Cities with a more educated population have experienced higher rates of economic growth. A consistently low rate of unemployment in Virginia, along with a relatively high demand for labor with advanced training, makes it likely that many U.Va. graduates will be available for employment in Virginia, which improves Virginia's business climate.
- Access to needed scientific and technical personnel is probably the single most important factor in the location of corporate research and development facilities. Being near a university or research center ranks close behind. Exceptional opportunities for higher education contribute to the quality of life within the state, which is also important in facility location since it makes recruiting talented staff easier.
- Top-notch universities contribute to the state's business climate. For example, the business web site Forbes.com specifically cited higher education as one of the important factors in giving Virginia its "Best State for Business" award in 2006. High rankings for business climate are enormously important advertisements for the state.
- There is a large and persistent gap in the proportion of students from different income groups who attend college. Nationally, financial aid has not equalized educational opportunity. Up through the 1970s, U.Va. tuition rates amounted to about 5 percent of the median adjusted gross income (AGI) of married couples in Virginia. It has now risen to about 10 percent of married couple AGI. During that time state support for the University Academic Division operating budget fell from 33 percent to its current 14 percent. Pell grant coverage of tuition bills fell from about 80 percent in the 1970s to the current coverage of just under 40 percent.

- In order to counter these trends, U.Va. has implemented an institutional aid program to meet 100 percent of the demonstrated need for all admitted undergraduates. Components of AccessUVa are (1) financial aid packages that provide 100 percent of need to all undergraduates, (2) elimination of loans for low income students or those whose family income is equivalent to 200 percent of the federal poverty level or less, (3) a cap on need-based loans for all students at 25 percent of the anticipated four-year cost of attendance, and (4) a financial literacy and debt management program for students and families. AccessUVa can be expected to increase enrollment by high academic achievers from lower income households.
- In FY 05, U.Va. faculty received almost \$300 million in research funding from outside of Virginia. On average, each full-time faculty position at U.Va. now generates in excess of \$100,000 in sponsored research funding, most of which derives from sources outside the state.
- Especially in the science and technology fields, the creation of new knowledge is strongly associated with local concentrations of industrial innovation, and industrial innovation is associated with locally increased economic growth. One of the key triggers for this local growth is the entrepreneurial activity of local faculty and graduate students. In the biotechnology industry there is a strong correlation between the location of leading faculty and the rate of formation of new biotech firms.
- Research parks at U.Va. are developed and managed by the U.Va. Foundation with the primary mission of supporting the academic mission of the University, not as an independent money-making enterprise or a regional development initiative.
- Not all of those desiring proximity to the University choose to locate in research parks. The list of employers with a clear connection to U.Va. includes federal and state agencies, start-up firms, and established businesses. Many other firms, although with less direct connections to faculty, probably have located in Virginia due in substantial part to the presence of the University as a center of research, learning, and expertise.
- The Patent Foundation at U.Va. earns income for the University from patents on faculty research. According to the foundation, in FY 05, patent income generated more than \$6 million in revenue, of which more than \$3.1 million was provided to U.Va. and the faculty as incentive compensation.
- The incentives provided by competition among universities for reputation, for funding, and for top students and faculty are responsible for maintaining the global leadership of American research universities. For each university, however, this competition can also increase the cost of acquiring some of the scarce resources needed to maintain and advance its academic standing.
- Despite increased competition and reductions in state support, U.Va. and other research universities in the state are seeking ways to enhance their status and maintain their current ranking among the top teaching and research universities in the nation. Management flexibility in meeting the challenges of today's higher education environment appears key to long-term success.

CHAPTER 1

THE STUDY IN BRIEF: OVERVIEW AND SUMMARY

INTRODUCTION

The University of Virginia, by providing world-class educational opportunities to citizens of the state, has played an important role in the lives of Virginians since its founding in 1819. The University enhances economic opportunity and provides a steady stream of citizens prepared to assume positions of leadership in business and in public service. In carrying out its core missions of education, research, and service, U.Va. has a vital impact on its community, on its region, and on the entire state. A complete picture of the economic impact of the University requires both a close-up lens, for the impact on the local community, and a wide-angle lens, for the impact on the state as a whole. Earlier studies of this sort have concentrated mostly on the local effects of university spending. We believe that this effort breaks new ground by providing an analysis of how a large public research university can contribute to the economy of an entire state. In making our case we review the literature on the economic rationale for state support of a major research university with a large component of students from other states and from other nations.

Chapter 1 provides a *broad overview* of both parts of the study. Chapter 2 provides more supporting detail, including methodology for the *local impact* part of the study. Chapter 3 explores in greater depth the broad impact of the University on *the state as a whole*.

LOCAL AREA

The definition of the local area affected by the University is necessarily arbitrary, since such factors as job commuting and purchases from vendors do not stop at a fixed boundary. For this study we define the local area as the Charlottesville Metropolitan Statistical Area (MSA). The MSA, which has a total population of 187,100, includes the city of Charlottesville and the counties of Albemarle, Fluvanna, Greene, and Nelson. Most of the University's impact on the area is confined to Charlottesville and Albemarle, which together account for seven out of ten area residents. Most of the University buildings are located in Albemarle County except some structures that are in Charlottesville.

The University is made up of many organizational units, so when the total impact is measured, it is necessary to consolidate information. We have included the Academic Division, the Medical Center, and three major component units—the Health Services Foundation, the Alumni Association, and the Darden School

Foundation.¹ We did not include non-U.Va. organizations in the two research parks and organizations with strong ties to the University or for which proximity to the University was a major attraction. Such organizations include the U.S. Army's Judge Advocate General's Legal Center and School, the National Radio Astronomy Observatory, the Virginia Transportation Research Council, and the Federal Executive Institute.

LOCAL SPENDING

Spending by the University, its employees, students, and visitors is obviously of primary importance to the local economy. We collected information from the University and major component units on payroll and other outlays in the local area. When asking for information we stipulated that we wanted only local spending. For example, a significant portion of capital outlay is for labor, materials, and equipment not supplied locally. We counted only the locally supplied goods and services. Since the University does not keep its accounts in that way, we asked for knowledgeable estimates of the local share of total expenditures. Faculty and staff expenditures also are an important stimulant for the local economy. Rather than query employees, we relied on payroll data to gauge local spending. To determine student expenditures we conducted a sample survey and to avoid double-counting of student outlays we excluded student employees from University payroll data. Another important component of University-related spending, and by far the most difficult to measure, is visitor spending. We developed visitor-spending estimates for twelve groups.

Spending by the University and Its Major Components

Spending in the local economy totaled \$790.6 million in 2005. The Academic Division spent more than three-fifths of this amount. The Medical Center and the closely related Health Services Foundation accounted for more than one-third of local outlays. In terms of expenditure categories, payroll of faculty and staff living in the MSA accounted for 70.6 percent of local outlays. Spending on facilities, maintenance, and capital outlays for construction accounted for 9.8 percent.

1. These three units accounted for four-fifths of component unit expenses in FY 2005. The remaining component units—the University of Virginia Law School Foundation, the Virginia Athletics Foundation, the University of Virginia Foundation, and the University of Virginia Investment Management Company—were excluded because of their small relative size or because a large part of their expenses constituted aid to students that we show elsewhere in the form of student expenditures. Source: *University of Virginia President's Report, 2004–05*, p. 69 <http://www.virginia.edu/president/report05/> (10/18/06)

Because construction and renovation of buildings is an ongoing activity at the University, we included capital outlay in our analysis of current spending. In FY 05 capital outlays totaled \$231 million, with \$161 million for construction and \$70 million for equipment. Capital outlay in FY 05 was at a record high, but not extreme in view of the average expenditure of \$171 million in the preceding four years. A substantial portion of capital outlays is spent locally, but because of the need for materials and equipment manufactured elsewhere, the amount spent locally is less than total outlays. In FY 05 the share of capital outlays spent locally was \$40.2 million or 17.4 percent. According to current plans for the next eight years, such spending for major capital projects will total \$2.1 billion.

Spending by Students

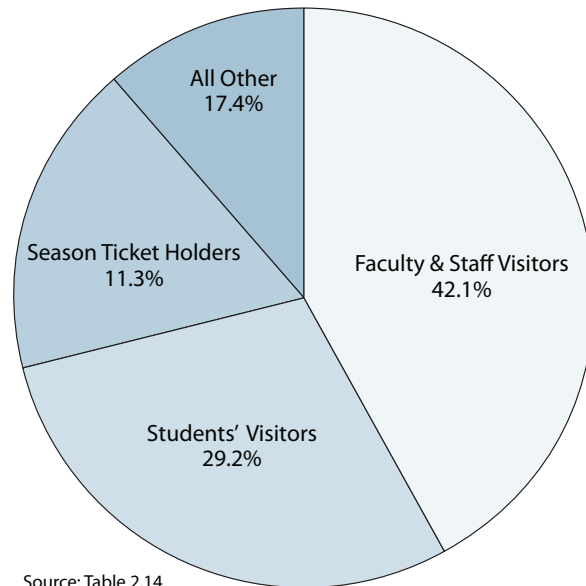
Student spending in the Charlottesville area totaled \$211.9 million in 2005. This figure does not include payments for University housing and meal plans because those expenditures are included in the previously cited figure on University spending. The largest student outlays were for rent, groceries, restaurants/bars, mortgage payments (mainly by graduate and professional students), and books and supplies.

Visitor Spending

The twelve groups covered in our estimate of visitor spending are: (1) visitors of faculty and staff, (2) students' visitors, (3) athletic-event season-ticket holders, (4) Medical Center outpatients and patients' families, (5) conference attendees, (6) attendees at Alumni Association events, (7) prospective students and their parents who came to Charlottesville, (8) participants in Darden Executive Education programs, (9) participants in continuing medical education, (10) book festival presenters and attendees, (11) film festival attendees, and (12) participants in the School of Continuing and Professional Studies Executive Development programs. Total spending by all groups was \$122.1 million in 2005, and the number of visitor-days was 1.6 million. (A visitor-day is derived by multiplying the number of visitors by the average length of stay.) The dollar figure excludes spending for University-provided meals and lodging because they are captured in the University spending totals. The John Paul Jones Arena, which did not exist in 2005, is not included in the visitor or expenditure estimates. The major sources of visitor spending are shown in **Figure 1.1**. Nearly three-fourths of the outlays were by visitors of faculty, staff, and students.

Figure 1.1
University Visitor Spending, 2005

Total: \$122.1 Million



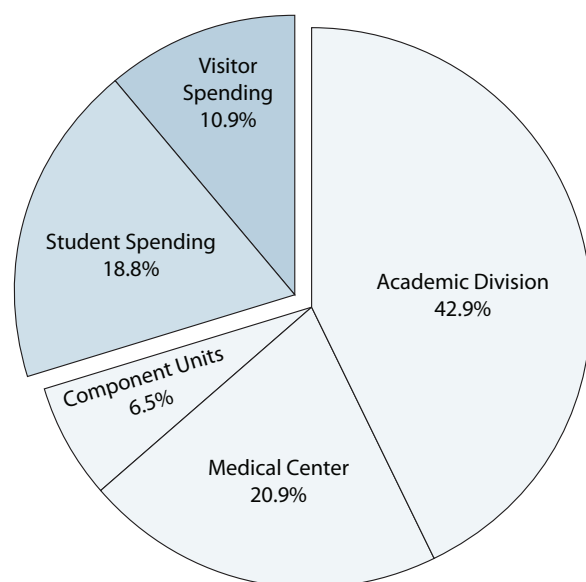
Source: Table 2.14.

Total Local Spending Attributable to the University

Total local spending by all University units, components, employees, students, and visitors was \$1,124.5 million in 2005. University spending, including faculty and staff payroll, accounted for nearly three-fourths of the total (**Figure 1.2**). Within this total, the Academic Division and the Medical Center accounted for the lion's share of

Figure 1.2
Total University-Related Spending, 2005

Total: \$1,124.5 Million



Source: Table 2.18.

spending. The three major component units were responsible for the remainder. Student spending accounted for 18.8 percent, and visitor spending for 10.9 percent. Not all of the dollars spent in the metropolitan area stay in the local economy because many of the goods and services purchased locally are produced elsewhere. Also, when dollars are spent locally, they often have multiplier effects as a portion of the spending results in added local incomes and additional spending. To measure the total impact of the University while allowing for these effects we used a regional economic analysis model. According to the model, the \$1,124.5 million of local spending resulted in direct local expenditures of \$758.4 million after allowing for a spending leakage of \$366 million as dollars went outside the community. The direct expenditures had multiplier effects so that the total local impact was \$1,096.6 million. The expenditure multiplier for University-related spending was 1.45. This means that for every dollar spent locally related to the University, the ultimate total spending was \$1.45. This is a conservative estimate since in constructing the model we restricted expenditures to those that were made initially in the local area. University employees who live outside the Charlottesville MSA in communities such as the cities of Staunton and Waynesboro and the counties of Augusta, Buckingham, and Orange were excluded. Furthermore, we did not include expenditures of entities closely connected with U.Va. such as the U.S. Army's Judge Advocate General's Legal Center and School.

UNIVERSITY EMPLOYMENT

The University is the dominant employer in the Charlottesville MSA. In 2005, the University had 19,487 employees, one-fifth of the area's total non-farm payroll employment of 95,300. The University employs 12,990 full-time and part-time salaried workers, 700 medical residents, and roughly 5,800 hourly workers during the academic year. The job count is higher than normally would be expected for an institution with 20,399 students because of the inclusion of the Medical Center, a facility that operates around the clock.

Another indication of the importance of U.Va. to the local labor market is that compensation of University employees accounted for a large share of total earnings in the Charlottesville MSA. In calendar year 2004 the University's total compensation and benefits expenditure was \$929 million, more than one-fifth of total earnings by place of work in the MSA.

UNIVERSITY INVOLVEMENT IN COMMUNITY SERVICES

In addition to being the principal driver of the local economy, the University participates in community services involving police, fire, emergency communications, rescue, solid waste disposal, charity, and Medical Center services. In many instances the University provides financial and other types of assistance.

Police

The University operates its own police department with sixty uniformed police officers and fifty uniformed security officers. They handle most day-to-day police work involving University property, personnel, and students. The department also works closely with the Charlottesville and Albemarle police; they share the same communications system, use the same records management system, and have reciprocal agreements to help one another. When there are large athletic, academic, or show events, the University contracts with other law enforcement agencies, including local police forces, to augment its police.

Fire

Although the University does not operate its own fire department, it provides financial support to the Charlottesville Fire Department in accordance with a long-term agreement. In FY 05 the University paid the city \$157,000. The University's Office of Environmental Health and Safety has worked closely with the Fire Department to reduce the number of false alarms. The University also is represented on the Fire Department's Regional Hazardous Materials Team.

Emergency Communications

The University helps to fund the Charlottesville-UVA-Albemarle Emergency Communications Center, which is responsible for the local 911 system. In FY 05 U.Va. paid for 15.75 percent of the center's police and administrative operations and for 20 percent of the technical budget; the total amount paid was \$302,266. The University is actively involved in the operation of the center. There are three U.Va. representatives on the center's ten-person governing board.

Rescue

The University is very supportive of rescue organizations in the metropolitan area. The University is a major financial contributor to the Charlottesville-Albemarle Rescue Squad (CARS). U.Va. gave the squad \$30,000 in FY 05. In addition, University personnel and students provide a great deal of personal time to the squad. More

than half of CARS's current roster of 165 is affiliated with the University. U.Va. employees and students also volunteer time to the Seminole Trail Volunteer Fire (and Rescue) Department and to other rescue squads in the area.

University Transit Service

The University's bus system, University Transit Service (UTS), provides approximately fifty-nine thousand hours of fixed route transit service and an additional ten thousand hours of service associated with events or charters. UTS routes make available frequent commuter service from large University-owned parking areas to the Central Grounds and to the Medical Center. Service is also provided along two adjacent corridors, which have dense concentrations of off-Grounds student residences. Annual passenger counts for UTS total approximately 2.9 million.

UTS works closely with Charlottesville Transit Service (CTS) on a number of operational initiatives including (1) an annual subsidy for the operation of the Charlottesville Free Trolley Route. The trolley provides free fifteen-minute service linking the Downtown Mall with the Central Grounds. The annual subsidy provided by the University to the city of Charlottesville in FY 07 is \$50,000; (2) a recently completed agreement providing for open ridership for U.Va. faculty, staff, and students on CTS. By showing a U.Va. identification pass, employees and students will be able to ride on any CTS route without paying the fare. The open ridership program on CTS for FY 08 involves a University payment of \$130,000; (3) a new parking and transit program for home football games. A special season parking pass is available for the city-owned Market and Water Street garages for the football season and a special "football shuttle" is operated by CTS.

Student Housing Inspection

The majority of U.Va. students, about 70 percent, are housed in private, off-Grounds housing. Because of the University's concern about the safety of student housing not under its direct control, it is paying the city of Charlottesville to employ a property maintenance inspector whose duties focus on enforcement of city and state building maintenance codes for private housing occupied by U.Va. students. Currently the University is paying the city \$46,846 to cover the cost of the inspector's salary and benefits.

Solid Waste Disposal

Because of its size and the nature of its activities, the University generates a significant amount of trash. U.Va. contracts with a firm to collect trash, transport it to the Ivy Materials Utilization Center for compaction, and then ship it to the Amelia landfill, where it is buried. According to the Rivanna Solid Waste Authority (RSWA), tipping fees from U.Va.-generated trash will total \$25,000 in FY 07. Under a recent arrangement with the authority, the University has agreed to pay part of the cost of pollution mitigation at the old Ivy Landfill that is now closed. In FY 07 the University's payment will be \$235,000. The University's Division of Recoverable and Disposable Resources is actively involved with waste management issues. In FY 05 the University was able to divert 41 percent of its municipal solid waste from the landfill through its recycling and reuse program—a superior performance when compared to the 31 percent rate for all of RSWA's customers.

Charitable Activities

Students, faculty, and staff provide community service in many ways, from fund-raising to helping people in need. Madison House, a campus clearinghouse for volunteer opportunities, recorded over 115,000 hours of student community service in 2005. Faculty and staff donate considerable amounts of money to local, regional, and global charities. They donated approximately \$788,000 to the state's annual Combined Virginia Campaign in 2006, with about one-fourth of full-time salaried employees participating. In addition, each year numerous U.Va. employees participate in a day of community service held in the fall.

Medical Center Programs

The Medical Center serves as a teaching hospital for the School of Medicine as well as a provider of specialized care for many illnesses and injuries. In its performance of these activities the center provides a great deal of service to residents of the local area. In FY 05 local outpatients numbered 86,021 and accounted for 45.1 percent of the total number served. Other measures of patient services in FY 05 also show the center's role as a local health provider. People from the metropolitan area accounted for a third of inpatient-days and three-fifths of emergency room visits. In addition, the Medical Center provides a significant amount of indigent care to local residents: \$11.8 million of inpatient care and \$15.8 million of outpatient care were provided.

The Medical Center conducts many outreach programs in the local area. These programs include health screenings, health and safety education, and special safety and wellness programs for children. In FY 05 the Medical Center's Community Relations, Outreach, and Service unit sponsored ninety-one local events with a total participation numbering 16,730.

THE UNIVERSITY AND LOCAL GOVERNMENT FINANCES

Because of its large size in terms of employment, student population, and occupied land area, the University has a major impact on local government finances in the city of Charlottesville and the county of Albemarle. Here, we examine several topics: (1) tax-exempt real property, (2) taxable real property owned by the University, (3) service charges in lieu of real property taxes paid by the University, and (4) real estate taxes paid by faculty, staff, and students compared to education services received.

Tax-Exempt Real Property

The University pays no property taxes on its academic operations because it is tax exempt. In FY 05 this exemption amounted to \$4.6 million of forgone tax revenue for Charlottesville and \$6.9 million for Albemarle County.

Taxable Real Property

The University does pay taxes on properties not used for academic purposes that are owned by the University of Virginia Foundation. A prime example is the Boar's Head Inn, which is owned by the foundation and which pays the same tax rate as applied to other commercial enterprises. In FY 05 the foundation paid Charlottesville and Albemarle property taxes totaling \$189,694 and \$1,149,487, respectively. Furthermore, all property owned by faculty, staff, and students is subject to taxation.

Service Charges

The University makes payments to local governments for University-owned faculty and staff housing as required by state law. In 2005 the University paid the city of Charlottesville \$33,158 for seven properties and the county of Albemarle \$105,047 for twenty properties. The most valuable properties are Morea in the city and the Pavilion Houses, Carr's Hill, and the Piedmont Faculty Houses in the county.

Real Estate Taxes Paid by Faculty, Staff, and Students and Education Services Received

With the notable exceptions of police, fire, emergency communications, and waste management, U.Va. does

not contribute directly to local government except for the previously mentioned service charges on University-owned faculty and staff housing. However, faculty, staff, students, and University visitors pay substantial amounts of local taxes. In particular, they pay local taxes on real estate (as owners or as renters, assuming the tax is shifted from owners to renters), retail sales, utilities, and meals. Visitors pay taxes on retail sales as well as lodgings. In addition, tax revenue is generated from the induced and indirect spending that was mentioned in the discussion of the regional economic model.

It is beyond the scope of this study to provide detailed comprehensive estimates of local taxes paid and benefits received; but in regard to public education, the largest cost of local governments, data are available for Charlottesville and Albemarle, the two local areas most impacted by the University. Based on surveys we conducted, the total value of taxable real estate owned or rented by faculty, staff, and students was \$3.3 billion in 2005, yielding \$28.3 million in property tax revenue, divided nearly equally between the two jurisdictions. In the city, the property tax revenue alone exceeded by \$2.3 million the local cost of educating the children of faculty, staff, and students; but in the county, which has about double the number of public school children attributable to U.Va., property tax revenue was \$7.5 million less than the education cost. Education expenditures are financed by a variety of local taxes, not just the property tax. In Charlottesville the real estate tax provides 48.7 percent of local tax revenue and in Albemarle, 57.9 percent. If information were available on other taxes paid by faculty, staff, and students and taxes generated by University and visitor spending, the result would show that local expenditures related to the University are more than covered by the taxes generated by its presence.

STATEWIDE IMPACT

THE FLOW OF DOLLARS INTO THE STATE

In FY 05, the state appropriation from the General Fund for operations at the University of Virginia amounted to \$132 million. In that same year, U.Va. brought into the state a total of \$456 million in out-of-state grants, giving, and graduate fellowships. On average then, \$1 of state support for the University supports activities which ultimately result in \$3.45 of new spending flowing into Virginia. Tuition payments by out-of-state students provided an additional flow of \$166 million into the state in 2005, which brings the FY 05 total to \$622 million, or \$4.71 for each dollar from the state

General Fund. Patients who come to Virginia for treatment at the Medical Center bring additional funds into the state. Also excluded from our total are consulting income and honoraria received by University faculty from sources outside the state. Without considering the value that U.Va. creates in fulfilling its educational and research missions, we can conclude that University operations directly generate annual inflows of income of well over \$600 million from sources outside the state.

The status of the University of Virginia as a nationally recognized center of excellence in teaching and research leverages the state government's expenditures into a considerable inflow of economic value to the state. Investments in excellent teaching and research have increased the value of the University to knowledge customers from around the world. As the University's reputation has risen, the net flow of funds into the state has increased dramatically.

VALUING THE OUTPUTS OF THE "KNOWLEDGE FACTORY"

The core mission of the University of Virginia comprises three closely related activities: teaching, research, and public service. In a modern research university such as U.Va. these functions are inextricably tied together. Talented graduate and undergraduate students help draw productive research faculty. In keeping with the long University tradition of public service, this cadre of students, faculty, and staff provides a considerable contribution of time, money, and expertise to charities, to free medical care, and to other public service activities worth millions of dollars each year.

Highly trained graduates who choose to live in Virginia provide value in the state economy as workers and leaders. Research creates value in the economy by generating new knowledge that spills over into the local economy as increased productivity and investment. And civic leaders are drawn disproportionately from those with college degrees.

EDUCATION: THE PRIVATE VALUE

Surveys indicate that increased future earnings are the reason most often given by students and parents for obtaining a college education. Wages rise with years of undergraduate and graduate education even for those students who do not complete a degree. Recent data from the U.S. Bureau of the Census indicate that, on average, those with college degrees earn about twice as much as those without a degree. Studies consistently show, how-

ever, that a large fraction of the apparent salary gain is from the added value of the college education.

A student pays for a college education with the expectation that the education will result in a net increase in wealth. Since rates of return to education are especially sensitive to costs, the private return to a Virginia resident attending U.Va. at in-state rates will be much higher than the return to attending a private university or a state university outside of Virginia at out-of-state rates.

Other things equal, students from disadvantaged backgrounds appear to have a higher return to investing in a degree at a more prestigious institution. This implies that there is considerable value to programs that provide greater access to U.Va. by talented students from poor and minority households. While these families have a higher-than-average expected return from a college degree, they also are the most likely to face barriers to investing in higher education. An aggressive financial aid package for eligible families, called AccessUVA, appears well targeted to boost attendance for students from disadvantaged backgrounds.

Not all of the benefits from earning a college degree are reflected in higher wage rates. First, degree-holders are more likely to have fringe benefits as a portion of their compensation package. One study found that health care coverage at work rises from 67 percent to 77 percent to nearly 95 percent for high school dropouts, high school graduates, and college graduates respectively. A college degree is associated with better pension plan coverage, better working conditions, greater job flexibility, and more choice about where to live. Finally, for many, college life is itself part of the value of earning a degree.

Someone deciding whether to attend college faces uncertainty about what things he or she is likely to do well or like the most. A college degree reduces uncertainty about the value of the options available to the student. Resolving this uncertainty may have substantial economic value. College also reduces future uncertainty by providing graduates with greater flexibility in responding to new job opportunities and by reducing the risk of job obsolescence.

EDUCATION: THE PUBLIC VALUE

The public gains when the level of education in society increases. These public benefits are shared by all and do not go only to the person investing in education. The

individual or family making the investment decision will not generally count these benefits when calculating their likely rate of return to getting a degree. Thus, there is some reason to believe that, in the absence of public support, people may systematically under-invest in education from a societal point of view.

Social Gains

Additional education is associated with reduced demands on some government services and with a number of positive social effects. [Rizzo, 2005]

Higher education levels are associated with lower crime rates and lower demands for welfare, disability insurance, and Medicaid. A recent study of the effects of education on public expenditures on crime and social services estimated the lifetime *public* gains attributable to a college degree compared to a high school diploma to be \$170,000 (in 1997 dollars) after subtracting the costs of public support for the college degree. [Krop, Carroll, Vernez, and Rydell, 2000] These figures probably overstate the gains to the degree itself since some of the gain comes from putting young people in a position to benefit from a college degree through investment in early childhood development and K-12 education.

Those with more education tend to give more of their time and money to charities and community service. One recent analysis found that 45.6 percent of college graduates participate in volunteer activities, compared to 21.7 percent of high school graduates. [Rizzo, 2005] College graduates donate more blood than those with only high school degrees, 17 percent to 11 percent. Voter participation increases with education levels, [Dee, 2003] and community leaders are drawn disproportionately from the ranks of the college-educated.

Economic Gains

The most obvious public economic gain from an individual's decision to attend college is the increase in tax revenues from the individual's higher earnings. This gain does not come without a cost. Expected future taxes also lower the rate of return on an investment in education. In essence, some portion of all future salary gains is dedicated to a public purpose through taxes. This somewhat reduces incentives for private individuals to invest in higher education. However, for those who do make the investment, the increased tax revenues generate a public economic benefit.

Studies show that, for urban areas in particular, the education level of the population affects future growth rates in the area.² [Glaeser, Scheinkman, and Shleifer, 1995; Glaeser and Saiz, 2003; Moretti, 2004; and Varga, 2000] Cities with a more educated population have experienced higher rates of economic growth than cities with less human capital. The cities with higher education levels grow faster because they have higher worker productivity, which is partly because workers in these cities adapt better to economic shocks; they are more flexible.

Students trained at a top-ranked school such as the University of Virginia compete at the national and international levels for jobs. Many graduates will take jobs elsewhere, and any subsidies to their education will constitute a loss to the state's economy. However, a consistently low rate of unemployment in Virginia along with a relatively high demand for labor with advanced training makes it likely that many U.Va. graduates will be available for employment in Virginia, which improves Virginia's business climate.

Access to needed scientific and technical personnel is probably the single most important factor in the location of corporate research and development facilities. Being near a university or research center ranks close behind. Exceptional opportunities for higher education contribute to the quality of life within the state, which is also important in facility location since it makes recruiting talented staff easier.

In this way, top-notch universities contribute to the state's business climate. For example, Forbes.com specifically cited higher education as one of the important factors in giving Virginia its "Best State for Business" award in 2006. High rankings for business climate are enormously important advertisements for the state.

Equal Economic Opportunity

There is a large and persistent gap in the proportion of students from different income groups who attend college. Only 28 percent of high school graduates from families in the lowest income quartile attend a four-year college, as opposed to 66 percent of students from top quartile families. [Ellwood and Kane, 2000] Even after controlling for student abilities, students from households with lower socioeconomic status are much less likely to continue education past high school. One study found that 96.7 percent of graduates from *high*

2. For some evidence counter to this view, see Topel, 2004.

income families and with *high test scores* go to college, while for graduates from *poor families* but having *high test scores*, only 77.6 percent enroll in college. Nationally, financial aid has not equalized educational opportunity.

Up through the 1970s, U.Va. in-state tuition and fees amounted to about 5 percent of the median adjusted gross income (AGI) of married couples in Virginia. It has now risen to about 10 percent of married couple AGI. During that time state support for the University Academic Division operating budget fell from 33 percent to its current 14 percent. Pell grant coverage of tuition bills fell from about 80 percent in the 1970s to the current coverage of just under 40 percent. The combination of these circumstances could be expected to cause a substantial reduction in the perceived affordability of U.Va., especially among those with lower incomes.

To counter these trends, U.Va. has implemented an institutional aid program to meet 100 percent of the demonstrated need for all admitted undergraduates. The program is called AccessUVa. Components of AccessUVa are (1) financial aid packages that provide 100 percent of need to all undergraduates, (2) elimination of loans for low income students or those whose family income is equivalent to 200 percent of the federal poverty level or less, (3) a cap on need-based loans for all students at 25 percent of the anticipated four-year cost of attendance, and (4) a financial literacy and debt management program for students and families.

Converting loan-based aid to grants for the families with the lowest income essentially reduces the “sticker price” of attending U.Va. to zero for these families. By limiting the use of borrowing to replace declining federal and state grants, the program avoids exposing lower income families to substantial financial risk. AccessUVa can be expected to increase enrollment by high academic achievers from lower income households, enhancing economic value, perceptions of fairness, and equality of opportunity.

THE VALUE OF UNIVERSITY RESEARCH

The modern research university is a knowledge factory. Research output is produced jointly with its other key output, the transmission of knowledge. Research supports the enhancement of human capital because top-ranked departments are needed to recruit and train top-tier graduate students. Top departments are defined by their creativity and productivity in generating new knowledge and new techniques of measurement and

analysis. The research function is essential for increasing the number of high performing graduate students in the state. While many of these students will eventually move elsewhere, they form a pool of ready recruits available to the Virginia job market.

State support for research at U.Va. also results in a flow of sponsored research funding, most of which comes from outside the state. In FY 05, U.Va. faculty received almost \$300 million in research funding from outside of Virginia.³ This amount alone is more than twice the total \$140 million state General Fund appropriation to the University. On average, each full-time faculty position at U.Va. now generates in excess of \$100,000 in sponsored research funding, most of which derives from sources outside of the state.⁴

Research and Growth

Especially in the science and technology fields, the creation of new knowledge is strongly associated with local concentrations of industrial innovation, and industrial innovation is associated with locally increased economic growth.

One of the key triggers for this local growth is the entrepreneurial activity of local faculty and graduate students. Firms seek out contractual relationships with “star” faculty, often locating research activities close by.

For those faculty who wish to participate directly in the formation of new firms, proximity to the University is very valuable. In the biotechnology industry there is a strong correlation between the location of leading faculty and the rate of formation of new biotech firms.

In funding basic research, firms are willing to seek out the top researchers in their field, even if these experts are at considerable distance from the firms’ other operations. Evidence suggests that, for industrial sectors of the economy with high rates of innovation, university research induces industrial R&D spending in close geographical proximity to the university. These effects appear to be large. In addition, a policy of dispersed public university systems does not appear to be as effective as a strategy of geographically concentrating top researchers.

3. This figure is derived by subtracting state-source funding from the \$312 million in sponsored research funding for FY 05.

4. http://www.web.virginia.edu/iaas/data_catalog/institutional/data_digest/emp_fac_gender.htm (01/04/07)

Universities can boost the impact of their research programs on local economic development by supporting faculty entrepreneurship, by facilitating the transfer of new knowledge, and by facilitating relationships between faculty and nearby firms. Research parks and patenting offices should not be judged by the income that they generate but rather should be viewed as tools in achieving the university's key goal of maximizing its value in the creation and transmission of knowledge; an important secondary goal is to help retain a reasonable share of that value in the state. Much of their benefit will be more subtle, namely an improved ability to recruit and retain top faculty and students, and an increase in local entrepreneurial activity and local development spillovers from the activities of highly talented researchers and their graduate students.

U.Va. Initiatives

The structure and focus of the University of Virginia's development initiatives appears consistent with the approach suggested by research. First, the recruitment and retention of top faculty and students is clearly the central organizing theme of U.Va.'s long-range plan. In addition, the University is pursuing a set of secondary initiatives designed to support, rather than compete with, the core academic mission. The development of research parks, assistance with patenting of faculty inventions, and a package of activities supporting entrepreneurial activities of faculty and students all serve to further the goal of academic excellence while encouraging local spin-off activity.

U.Va. has been successful recently at recruiting a number of top-ranked researchers in the science and technology disciplines. The presence of these scholars will increase research funding coming into the state and will enhance the reputation of the University in science and technology, leading to local economic development benefits. In addition, the Board of Visitors has committed \$126 million towards enhancing science and technology research at the University of Virginia by hiring ten new world-class researchers and providing space and infrastructure in support of their work. The initiative has to date resulted in the hiring of five nationally recognized scholars, one each in engineering, chemistry, and genetic epidemiology, and two in cell biology.⁵

Research parks at U.Va. are developed and managed by the U.Va. Foundation with the primary mission of

supporting the academic mission of the University, not as independent money-making enterprises or regional development initiatives. Fontaine Research Park has a more direct academic function, housing clinical and research space, a HealthSouth rehabilitation hospital, and assorted University offices. Fontaine also houses the CFA Institute, an international organization that confers the chartered financial analyst designation on candidates who have met its requirements.

The University of Virginia Research Park, to the north along U.S. Route 29, is managed to ensure that firms with natural connections to the University are able to arrange suitable space. It provides space for faculty start-ups as well as for numerous research offices of major corporations seeking proximity to U.Va. faculty.

Not all of those desiring proximity to the University choose to locate in research parks. The list of employers with a clear connection to U.Va. includes federal and state agencies, start-up firms, and established businesses. Many other firms, although with less direct connections to faculty, probably have located in Virginia due in substantial part to the presence of the University as a center of research, learning, and expertise.

The Patent Foundation at U.Va. earns income for the University from patents on faculty research. According to the foundation, in FY 05, patent income generated more than \$6 million in revenue, of which more than \$3.1 million was provided to U.Va. and the faculty as incentive compensation. The Patent Foundation, through its Spinner Technologies subsidiary, offers business-consulting services to faculty entrepreneurs in return for a share of ownership in resulting firms.

The Patent Foundation has created a venture capital unit, the Jefferson Corner Group, described as an "angel investment fund," to match investors with the start-up entrepreneurial efforts of University researchers. Matching available local investment funds with entrepreneurial researchers can be expected to provide an additional gain in local economic activity arising from University research.

The Office of the Vice President for Research and Graduate Studies has established the T100 Alumni Mentoring Program, which matches alumni mentors with faculty start-up businesses. Mentors provide strategic advice, help with external financing, and business contacts.

5. http://www.virginia.edu/vprgs/faculty_recruitment.html (01/04/07)

These efforts all generally fit the model of the University, having a core mission of creating and transmitting knowledge and, at the same time, encouraging local entrepreneurship. Much of the knowledge created has considerable economic value. Facilitating the transfer of the new knowledge to private markets can be profitable for the University but is probably of more value in recruiting and retaining top faculty and in boosting local economic development.

Research and Education as Joint Products

The greatest distinguishing characteristic of a modern research university such as U.Va. is its concentration of human capital in the form of highly trained and qualified academic faculty. Universities accumulate this intellectual capital as the key input in the creation and dissemination of knowledge.

Faculty divide their time between undergraduate education, graduate education, and research. The quality of the faculty, as measured by rankings, research excellence, and ability to mentor the next generation of researchers, is perceived to be an important input to both graduate and undergraduate education. However, faculty productivity can only be maintained by sustained high-quality research output. Research universities and departments always face a difficult trade-off between the commitment of resources to education and research.

The key to establishing policies that maximize the public value of major research universities such as the University of Virginia may lie in the structure of incentives faced by these universities. American research universities have been able to retain their global dominance through the better part of the last sixty years because of the decentralized, competitive structure of the university system, which rewards innovative and entrepreneurial behavior. An intense competition for resources and for

professional status occurs among universities, among departments, and among individual faculty and administrators. Research universities compete for customers among students and their families, government funding agencies, foundations, and corporations.

Competition among universities gives them incentive to innovate, to control costs, and to maximize the value of their output to their customers. The increased flexibility that Virginia's universities received under the 2005 restructuring legislation may help them better respond to their competitive challenges.

Given that many states are now making strong research universities central to their economic development plans, competitive pressures may make it difficult for Virginia's major research universities to maintain their national and international stature. As Virginia government provides a smaller and smaller share of the budgets of the research universities in the state, it is possible that these schools may lose some of their prominence due to the fierce competition among states and schools. This, in turn, would make it more difficult for the state to attract top students and faculty with the corresponding reduction in development of knowledge-dependent business establishments.

If U.Va. and the other research universities in the state are able to maintain their high rankings in teaching and research in spite of reductions in state support, it will be because they have responded to the competitive pressures by shifting university priorities in ways that will maintain and enhance their status in the new lower state-funded environment. University operations will likely continue to have major benefits for the state economy; success in this competition for academic status will ensure that U.Va. will continue to make an important contribution to the economy of the state.

CHAPTER 2

A DETAILED ANALYSIS OF THE UNIVERSITY'S LOCAL IMPACT

INTRODUCTION

In this chapter we provide detailed information on the University's local impact. Some of the information summarized in Chapter 1 is repeated, but most of the content is new. The chapter covers nine major topics: (1) local spending by the University and by faculty and staff; (2) local spending by students; (3) local spending by visitors whose presence was due to activities associated with the University; (4) capital outlay spending by the University; (5) total local spending by the University, including indirect effects as measured by a regional model; (6) employment at the University; (7) University involvement in local community services; (8) service charges on University-owned tax-exempt property; and (9) local taxes paid by University faculty, staff, and students and benefits received.

In this study we measure the University's economic impact on the Charlottesville metropolitan statistical area (MSA). The MSA, as defined by the federal government's Office of Management and Budget, is composed of the city of Charlottesville and the counties of Albemarle, Fluvanna, Greene, and Nelson.

Table 2.1
Population of the Charlottesville MSA, 2005

Locality	Number	Percent of Total MSA
City of Charlottesville	39,900	21.3
Albemarle County	90,400	48.3
Fluvanna County	24,900	13.3
Greene County	16,900	9.0
Nelson County	15,000	8.0
Total MSA	187,100	100.0

Source: Michael A. Spar and Qian Cai, 2005 Population Estimates (Charlottesville: University of Virginia Weldon Cooper Center for Public Service, May 2006). pp. 10-14.

Note: Detail may not add to totals due to rounding.

The University's local impact is concentrated in Charlottesville and Albemarle, which together account for close to seven out of ten metropolitan area residents. Most of the University's buildings are located in Albemarle County except some structures that are in Charlottesville.¹ The definition of the local area as the MSA is necessarily arbitrary, since such factors as job commuting and purchases from vendors do not stop at a fixed boundary. This is especially pertinent for workers, many of whom commute from more distant locations

1. In earlier times when the city of Charlottesville annexed territory from Albemarle County, the campus was not included. This led to the current situation in which most of the University buildings are in the county with the campus surrounded by the city.

such as the Shenandoah Valley, Madison and Orange counties, and the Richmond area.

The University is made up of many organizational units, so when the total impact is measured, it is necessary to consolidate information. We have included the Academic Division, the Medical Center, and three major component units—the Health Services Foundation, the Alumni Association, and the Darden School Foundation.² We did not include non-U.Va. organizations in the two research parks and organizations with strong ties to the University or for which proximity to the University was a major attraction. Such organizations include the U.S. Army's Judge Advocate General's Legal Center and School, the National Radio Astronomy Observatory, the Virginia Transportation Research Council, and the Federal Executive Institute.³

LOCAL SPENDING BY THE UNIVERSITY AND BY FACULTY AND STAFF

Spending by the University and its employees is of primary importance to the local economy. We collected information from the University and major component units on payroll and other outlays in the local area. When asking for information we stipulated that we wanted only local spending. For example, a significant portion of capital outlay is for labor, materials, and equipment not supplied locally. We counted only the locally supplied goods and services. Since the University does not keep its accounts according to whether expenditures were local or not, we asked for knowledgeable estimates of the local share of total expenditures. Faculty and staff expenditures are an important stimulant for the local economy. Rather than query employees, we relied on payroll data to gauge their local spending. To determine student expenditures we conducted a sample survey, and to avoid double-counting of student outlays we excluded student employees from University payroll data.

2. These three units accounted for four-fifths of component unit expenses in FY 2005. The remaining component units—the University of Virginia Law School Foundation, the Virginia Athletics Foundation, the University of Virginia Foundation, and the University of Virginia Investment Management Company—were excluded because of their small relative size or because a large part of their expenses constituted aid to students that we show elsewhere in the form of student expenditures. Source: *University of Virginia President's Report, 2004-05*, p. 69 <http://www.virginia.edu/president/report05/> (10/18/06)

3. Web locations: The Judge Advocate General's Legal Center and School (<http://www.jagcnet.army.mil/TJAGSA>), the National Radio Astronomy Observatory (<http://www.cv.nrao.edu/>), the Virginia Transportation Research Council (<http://vtrc.virginiadot.org/>), and the Federal Executive Institute (<http://www.leadership.opm.gov/Locations/FEI/index.aspx>). (10/18/06)

As shown in **Table 2.2** total local spending by the University and its major components in 2005 was \$790.6 million. The Academic Division spent more than three-fifths of this amount. The Medical Center and the closely related Health Services Foundation accounted for over one-third of local outlays. In terms of expenditure categories, payroll of faculty and staff living in the local area accounted for 70.6 percent of local spending. Spending on facilities, maintenance, and capital outlays for construction accounted for 9.8 percent. Capital outlays were included because they are a recurring annual expense historically and will be in the future, as illustrated in a later section of this chapter.

LOCAL SPENDING BY STUDENTS

Student expenditures were estimated based on a sample survey of students living in the Charlottesville MSA. Students were broken into four groupings: first-year undergraduates, other undergraduates, professional-school graduate students (medicine, law, and business administration), and other graduate students. Students were grouped in these categories because we assumed that living patterns and/or income would vary among groups. For example, since first-year undergraduates are required to live in dormitories, we knew that their living pattern would be different from that of other undergraduates. In regard to professional students, we

Table 2.2
Local Spending by the University and Its Major Component Units, 2005

Major Categories	Academic Division (\$)	Medical Center (\$)	Health Services Foundation (\$) ^a	Darden Foundation (\$)	Alumni Association (\$)	Total	
						Amount (\$)	% of Total ^b
Payroll ^c	301,304,450	196,094,284	40,000,000	15,282,470	5,306,951	557,988,155	70.6
Facility							
Contract construction	24,796,907	13,370,000	1,983,861			40,150,768	5.1
Building and maintenance operations	37,154,293	112,419			73,780	37,340,492	4.7
Utilities	8,611,867	749,805		529,781	191,634	10,083,087	1.3
Wholesale and retail purchases							
Food and beverages	10,274,606	34,196		1,399,190	659,155	12,367,147	1.6
Furniture	2,841,989	61,313				2,903,302	0.4
Office supplies	2,780,911	282,790			56,984	3,120,685	0.4
Building materials and supplies	1,395,872	51,714		772,425	17,909	2,237,920	0.3
Other	9,525,034	21,446,833		408,355	576,345	31,956,567	4.0
Services							
Accounting/auditing/ bookkeeping	2,732,047				66,494	2,798,541	0.4
Advertising/marketing/promotion	4,137,426	416,132		924,950	197,489	5,675,997	0.7
Computer/data processing services	3,318,171	403,711			16,398	3,738,280	0.5
Repair services	11,573,907	125,304				11,699,211	1.5
Management/consulting services	5,308,494	1,406,780				6,715,274	0.8
Educational services	13,154,766	46,038		681,889	21,675	13,904,368	1.8
Equipment rent/lease (except autos)	3,447,160				242,648	3,689,808	0.5
Hotel and lodging	7,987,002	62,582		342,674	45,942	8,438,200	1.1
Other services	647,447	22,333			265,321	935,101	0.1
Transportation							
Air	6,288,596				326,756	6,615,352	0.8
Motor freight and transportation	746,523	43,340			21,727	811,590	0.1
Auto purchases	2,619,657					2,619,657	0.3
Maintenance, repair, and operation	1,053,475	79,297			954	1,133,726	0.1
Incidentals							
Insurance	8,270,701	5,903			103,950	8,380,554	1.1
Postal	4,954,375	73,128		180,204	412,031	5,619,738	0.7
Printing	7,202,347	93,448		1,796,503	580,650	9,672,948	1.2
Grand total	482,128,023	234,981,350	41,983,861	22,318,441	9,184,793	790,596,468	100.0

Source: Information provided by Office of Financial Analysis; Human Resources-Academic Division-Information and Technologies; Medical Center Controller's Office; Health Services Foundation; Darden School Foundation; and Alumni Association of the University of Virginia's Office of Finance and Administration.

Note: Detail may not add to totals due to rounding

a. Medical Center and foundation finances are intertwined. To avoid double counting only the payroll of the foundation is shown.

b. Percentages do not add to 100.0 due to rounding.

c. Total payroll, excluding student employees, after federal and state income taxes, employee social security taxes, and employee contributions to tax-deferred investments.

Table 2.3
Monthly Student Expenditures in the MSA, 2005^a

Item	First-Year Responses (\$) (N=247)	Other Undergraduate Responses (\$) (N=208)	Graduate Student Responses (\$) (N=257)	Professional Student Responses (\$) (N=250)
Rent (non-University housing)	1.56	269.58	390.35	567.09
Mortgage	16.07	24.64	222.37	92.10
Rent to fraternity or sorority	2.83	47.68	0.00	0.00
Cable TV	14.57	15.35	24.39	34.12
Cell phone	4.90	9.24	31.64	27.73
Natural gas/heat oil	4.86	11.35	26.56	23.42
Sewer	2.11	3.15	5.00	2.73
Telephone	2.43	2.61	20.45	14.30
Water	3.18	6.48	10.67	14.29
Books and supplies	98.59	77.18	43.67	80.32
Clothing	37.58	47.74	47.28	59.86
Entertainment, recreation, and sports ^b	22.14	104.76	33.99	48.97
Fraternity/sorority meal plans	1.70	14.65	0.49	0.00
General merchandise	13.37	30.26	48.39	56.64
Groceries	34.16	113.27	241.03	240.18
Laundry/dry cleaning	11.82	9.29	9.11	17.40
Local transit	2.09	1.04	1.49	3.00
Meal plan ^c	478.83	149.16	8.27	5.24
Medical/dental out-of-pocket	4.31	4.86	40.22	47.45
Motor vehicle service, fuel, and purchase	6.74	51.85	101.89	109.89
Other personal services ^d	12.67	21.70	30.37	40.37
Medicine, prescription and non prescription	8.68	14.17	24.08	17.32
Restaurants and bars	40.44	90.99	106.98	156.82
Total	825.63	1,121.00	1,468.69	1,659.24
Exhibit:				
Number of students living in MSA	3,111	10,313	4,428	2,310
Average number of months resident in MSA	8.7	9.1	11.3	10.0

Note: Student expenditures for University housing are not included in this table. They are incorporated in University expenditures for building maintenance and construction.

a. Averages for all respondents including those who did not answer a question or answered "zero."

b. Includes fraternity/sorority social dues.

c. Not used for aggregate spending estimates because already counted in University expenditures.

d. Includes barbershop, beauty shop, fitness facilities, etc.

N = number of responses.

assumed they would be older and have higher incomes than other graduate students. Random samples of five hundred each were drawn from the 20,202 students residing in the MSA.⁴ The on-line survey was administered by the Center for Survey Research at the Weldon Cooper Center for Public Service. A copy of the questionnaire is shown in Appendix C.

4. We had records for 20,698 students. Of this number, 17,460 records had ZIP codes in the MSA, 3,195 had ZIP codes outside the MSA, and 43 had no ZIP code. We subjected those with ZIP codes outside the MSA to further scrutiny and found that 2,699 records had ZIP codes involving a one-way commute to Charlottesville of greater than 1 1/2 hours, an implausible result that probably was due to the incorrect provision of home address rather than local address. We grouped the 43 records with no ZIP code and the 2,699 records with very distant ZIP codes with the 17,460 records with explicit MSA ZIP codes as MSA records.

Information from the student sample on monthly expenditures is shown in **Table 2.3**. The amounts shown are averages for all of the respondents, including those who did not answer a particular question or who answered "zero." As would be expected, the largest monthly outlays are for housing and food.⁵

To obtain estimates of total local spending, monthly expenditures for each student group were multiplied by the average number of months students lived in the MSA and the total number of students living in the MSA (**Table 2.4**). We excluded from the totals student spending for University housing and for University meal plans because those expenditures are included in

5. This observation does not apply to first-year students since their University-provided housing was not included in the survey.

Table 2.4
Total Local Expenditures of Students Living in the MSA, 2005

Item	First-Year Students (\$)	Other Under-graduates (\$)	Graduate Students (\$)	Professional Students (\$)	All Students	
					Amount (\$)	% of Total
Rent (non-University housing)	42,222	25,299,625	19,531,709	13,099,779	57,973,335	27.4
Mortgage	434,946	2,312,422	11,126,594	2,127,510	16,001,472	7.6
Rent to fraternity or sorority	76,596	4,474,687			4,551,283	2.1
Cable TV	394,347	1,440,571	1,220,388	788,172	3,843,478	1.8
Cell phone	132,622	867,158	1,583,152	640,563	3,223,495	1.5
Natural gas/heat oil	131,539	1,065,178	1,328,967	541,002	3,066,686	1.4
Sewer	57,109	295,622	250,182	63,063	665,976	0.3
Telephone	65,770	244,944	1,023,244	330,330	1,664,288	0.8
Water	86,069	608,137	533,888	330,099	1,558,193	0.7
Books and supplies	2,668,407	7,243,212	2,185,090	1,855,392	13,952,101	6.6
Clothing	1,017,129	4,480,318	2,365,721	1,382,766	9,245,934	4.4
Entertainment, recreation, and sports ^a	599,235	9,831,548	1,700,737	1,131,207	13,262,727	6.3
Fraternity/sorority meal plans	46,012	1,374,878	24,518		1,445,408	0.7
General merchandise	361,868	2,839,850	2,421,261	1,308,384	6,931,363	3.3
Groceries	924,564	10,630,197	12,060,273	5,548,158	29,163,192	13.8
Laundry/dry cleaning	319,917	871,851	455,832	401,940	2,049,540	1.0
Local transit	56,567	97,602	74,554	69,300	298,023	0.1
Medical/dental out-of-pocket	116,653	456,103	2,012,464	1,096,095	3,681,315	1.7
Motor vehicle service, fuel, and purchase	182,423	4,866,034	5,098,209	2,538,459	12,685,125	6.0
Other personal services ^b	342,922	2,036,508	1,519,605	932,547	4,831,582	2.3
Medicine, prescription and non prescription	234,930	1,329,830	1,204,877	400,092	3,169,729	1.5
Restaurants and bars	1,094,537	8,539,257	5,352,894	3,622,542	18,609,230	8.8
Total	9,386,384	91,205,532	73,074,159	38,207,400	211,873,475	100.0

Note: Monthly estimates were converted to annual estimates based on the average number of months students lived in the Charlottesville MSA. Student expenditures for University housing and the meal plan are not included in this table. They are incorporated in University expenditures for building maintenance and construction and for meal plan services.

a. Includes fraternity/sorority social dues.

b. Includes barbershops, beauty shops, fitness facilities, etc.

University spending. Students spent \$211,873,475 in 2005. The largest outlays were for rent, groceries, restaurants and bars, mortgage payments (mainly by graduate and professional students), and books and supplies.

VISITOR SPENDING

The University, including its large Medical Center, attracts numerous visitors to the Charlottesville area. Because of the great variety of visitors, the best way to estimate their number and spending is to make estimates of various types of visitors and then aggregate them. We made numerous assumptions to derive estimates because detailed information is not readily available.⁶

We developed visitor-spending estimates for twelve groups, listed in order of relative importance in terms of visitor-days. A visitor-day is equivalent to one

visitor staying one day; thus, a visitor who stayed five days while enrolled in a local course would have stayed five visitor-days.

The visitor groups we identified were (1) visitors of faculty and staff, (2) students' visitors, (3) athletic event season ticket holders, (4) Medical Center outpatients and patients' families, (5) attendees at Alumni Association events, (6) conference attendees, (7) prospective students and their parents who visited Charlottesville, (8) participants in continuing medical education, (9) book festival presenters and attendees, (10) film festival attendees, (11) participants in School of Continuing and Professional Studies Executive Development Programs, and (12) participants in Darden Executive Education.

The estimates are limited to visitors from outside the Charlottesville MSA because spending by local visitors does not add to total spending in the area. Instead, such spending primarily replaces other types. In the remainder of this section we explain how we derived estimates for each visitor category.

6. For a good introduction to methods for estimating tourism and related problems, see Daniel J. Stynes, "Economic Impacts of Tourism" (Paper used in his course PRR 840, Recreation and Tourism Economics, Department of Community, Agriculture, Recreation and Resource Studies, Michigan State University) <http://www.msu.edu/course/prr/840/econimpact/pdf/ecimpvol1.pdf> (7/19/06)

Table 2.5
Information about Faculty and Staff Visitors, 2005

Employee Category	Average Number of Visitors	Average Length of Stay (Days)	Average Number of Visitor-Days	Average Percentage of Visitors Staying in Motels/Hotels ^a
Instructional, administrative, and professional	13.1	4.7	61.6	21.5
Office clerical	11.0	2.3	25.3	18.5
Service/maintenance	9.9	2.4	23.8	15.3
All faculty and staff	10.9	3.4	37.1	17.8

a. Percentage includes all respondents who said their visitors stayed in motels/hotels all or most of the time and one-half of the respondents who said visitors stayed in motels/hotels sometimes.

FACULTY AND STAFF VISITORS

The number of visitors and their length of stay (visitor-days) were based on responses to questions in our sample survey of faculty and staff living in the MSA. The questionnaire asked respondents how many visitors they had in the past year, the average number of days stayed by visitors, and the frequency of hotel/motel use by visitors. Averages were derived from all persons who participated in the survey, including respondents who did not answer the visitor questions or who answered zero. Survey results are summarized in **Table 2.5**.

We multiplied the average number of visitor-days for each employee category by the number of employees living in the MSA to provide an estimate of the annual number of faculty and staff visitors staying in the MSA. To calculate visitor spending, we examined several sources of data on visitor expenditures.

According to the Virginia Tourism Corporation's 2003/2004 Virginia Visitor Study⁷ the average pleasure visitor to Virginia spent \$31 per person per day. Of that amount, \$9 was used for lodging expenses and \$8 for food expense. These were averages including many visitors who did not stay overnight or stayed with friends or family. Nonetheless, we felt that the \$31 figure was too low for the Charlottesville area, where the average motel/hotel charge for a single/double room in establishments with 50 or more rooms is \$91.60.⁸

We decided to use visitor-spending data from a 2001 Monticello economic impact study conducted by the Weldon Cooper Center.⁹ The data from the

Monticello study more accurately reflect visitor expenditures because they are specific to the Charlottesville MSA and probably represent a more affluent group of visitors than covered in the Virginia Tourism Corporation study.

The Monticello study developed estimates of visitor spending based on a sample survey of visitors. The average amount spent per person per day was \$92.77. We inflated this number and its component parts by 13.4 percent, the increase in the Consumer Price Index from 2000 to 2005. The results are shown in **Table 2.6**.

Table 2.6
Monticello Study on Spending per Person per Day

Spending by Category	Amount (\$)	
	Year 2000 Dollars	Year 2005 Dollars
Lodging	34.83	42.05
Food and beverages	24.49	29.57
Entertainment and recreation	10.26	12.39
Auto rentals	1.82	2.20
Gasoline	4.06	4.90
Gifts and other retail purchases	14.76	17.82
Other	2.55	3.08
Total	92.77	112.01

Source: John L. Knapp and Catherine Barchers. *Monticello's Economic Impact on the Charlottesville-Albemarle Area*. December 2001. <http://www.virginia.edu/coopercenter/vastat/publications/monticellodocument.pdf> (accessed 2/16/07).

When calculating total visitor spending we used the full Monticello study value only for the percentage of visitors we assumed stayed in a hotel or motel. For the remaining visitors, we calculated spending with the \$42.05 for lodging removed.

In summary, we estimate that the number of visitors of faculty and staff in 2005 totaled 158,663. Allowing for their length of stay, there were 633,214 visitor-days. Visitors spent locally \$51,387,389. The major categories of spending are shown in **Table 2.7**.

7. The study can be viewed at <http://www.vatc.org/research/PleasureRelated/PleasureRelatedProfile.htm> (7/21/06).

8. Based on listings in the *2006 Mid-Atlantic AAA Guide*.

9. John L. Knapp and Catherine E. Barchers, *Monticello's Economic Impact on the Charlottesville-Albemarle Area* (Charlottesville: Weldon Cooper Center for Public Service, December 2001), pp. 15-16. See also: www.virginia.edu/coopercenter/vastat/publications/monticellodocument.pdf (11/28/06)

**Table 2.7
Spending by Visitors of Faculty and Staff, 2005**

Expenditure Category	Amount (\$)	Percent of Total
Eating and drinking	18,724,138	36.4
Other retail	21,079,693	41.0
Lodging	7,087,738	13.8
Vehicle rental	3,102,749	6.0
Gasoline	1,393,071	2.7
Total	51,387,389	100.0

STUDENTS' VISITORS

As part of our student survey we asked respondents how many visitors they had in the past year, the average number of days stayed by visitors, and the frequency of hotel/motel use by visitors. Results are reported in **Table 2.8**. For all students the average number of visitors per school year was 9.2, and the average length of stay was 2.4 days for each visitor. This translated into twenty-two visitor-days per student. Many of the students' visitors stayed with students, friends, and families; 28.1 percent of the visitors stayed in motels or hotels.

**Table 2.8
Information about Students' Visitors from the Student Survey, 2005**

Student Category	Average Number of Visitors	Average Length of Stay (Days)	Average Number of Visitor-Days	Average Percentage of Visitors Staying in Motels or Hotels ^a
First year	6.1	1.6	10	34.7
Other undergraduate	10.1	1.6	16	30.3
Graduate	10.5	3.9	40	23.4
Professional	10.2	2.4	25	24.4
All students	9.2	2.4	22	28.1

a. Percentage includes all respondents who said their visitors stayed in motels/hotels all or most of the time and one-half of respondents who said visitors stayed in motels/hotels sometimes.

To obtain University-wide totals, we multiplied the average number of visitor-days for each student category by the total number of students in each category to get a total number of visitor-days. Next, we multiplied the total number of visitor-days by the visitor expenditure values from the Monticello study to obtain total student visitor spending. The survey results indicated that 28.1 percent of visitors stayed in hotels or motels, so spending on lodging was calculated only for that percentage of all visitors. We estimate that the number of student visitors in 2005 totaled 435,622 and they spent locally \$35,607,814. Most of the visitor outlays were for food and beverages and for retail purchases; those categories combined accounted for 76.9 percent of the spending (**Table 2.9**).

**Table 2.9
Spending by Students' Visitors, 2005**

Expenditure Category	Amount (\$)	Percent of Total
Eating and drinking	12,881,343	36.2
Other retail	14,501,857	40.7
Lodging	5,131,698	14.4
Vehicle rental	2,134,548	6.0
Gasoline	958,368	2.7
Total	35,607,814	100.0

SEASON TICKET HOLDERS

To estimate spending by nonresidents of the Charlottesville MSA at University athletic events, we obtained a list of current season ticket holders from the Department of Athletics. There were 7,724 ticket holders who lived outside the Charlottesville MSA. We drew a random sample of five hundred and mailed them, in February 2006, a one-page questionnaire with a postage-paid return envelope. A copy of the questionnaire with the covering letter is shown in Appendix D. We received 237 responses for a response rate of 47.4 percent. While the survey encompassed all sports, in reality those living outside the MSA mainly hold tickets for football and men's basketball.

The survey asked ticket holders about their spending for individual categories. To derive total expenditures by category of expenditure (e.g., game food, restaurants) we multiplied the average expenditure per game per ticket by an average of 3.9 tickets per ticket holder by an average of 6.9 games attended per ticket holder by 7,724 ticket holders (**Table 2.10**).

**Table 2.10
Spending by Non-resident Season Ticket Holders, 2005**

Item	Avg. Expenditure per Game per Ticket (\$)	Total Spending (\$) ^a
Parking	1.72	357,080
Game food	8.46	1,758,755
Souvenirs	3.16	656,602
Restaurants	18.90	3,927,886
Lodging	16.89	3,510,581
Gasoline	5.55	1,152,784
Other retail purchases	11.70	2,431,345
Total	66.37	13,795,033

a. (Average expenditure per game per ticket) X (an average of 3.9 tickets per ticket holder) X (an average of 6.9 games attended per ticket holder) X (7,724 ticket holders).

Not all respondents purchased every item. Since the averages were computed using all respondents in the denominator, the averages are lower than they would be if based solely on amounts reported by respondents who spent on an item. Most respondents reported spending on game food and restaurants, but only about a third spent on parking and lodgings. We estimate the number

of visitor days for season ticket holders totaled 207,852. Of the \$13,795,033 of total spending, two-thirds was for food at games and at local restaurants and for lodging.

CONFERENCE ATTENDEES

The University's Conference Division provides housing and food service for many summer conferences. University spending to provide food and lodging services is already included in the general expenditures in the regional model that was used, so they are not counted here.

Deriving spending estimates from the Monticello study, we have estimated participant per-day expenditures for gifts and other retail items, gasoline, auto rental, and entertainment totaling \$40. We multiplied this figure by the total number of participant-days (123,707) to obtain total expenditures of \$4,948,280 (Table 2.11).

ALUMNI ASSOCIATION VISITORS

The Alumni Association of the University of Virginia draws a large number of visitors to the University to

Table 2.11
Conference Division Programs, Calendar Year 2005

Program (Listed in Order of Number of Participant-Days)	Starting Date	Participants	Days	Number of Participant-Days
Summer Medical and Dental Education Program	06/02/05	136	57	7,752
Summer Session II	06/12/05	240	31	7,440
Ernst and Young Accounting Summer School II	06/02/05	76	78	5,928
Graduate School of Retail Bank Management	07/15/05	425	13	5,525
Graduation Housing	05/20/05	1,200	4	4,800
Ernst and Young Summer School I	06/01/05	60	79	4,740
Summer Language Institute	06/12/05	70	55	3,850
Summer Enrichment Program I	06/26/05	312	12	3,744
Summer Enrichment Program II	07/10/05	312	12	3,744
Summer Enrichment Program III	07/24/05	312	12	3,744
University Cheer Association Elite Program	08/09/05	765	4	3,060
Al Groh Football Camp	06/26/05	645	4	2,580
University Cheer Association Dance Program	08/04/05	505	5	2,525
Transitions-Summer Session	07/06/05	60	38	2,280
Upward Bound	06/26/05	60	34	2,040
Young Writers Workshop II	07/03/05	95	20	1,900
Virginia Soccer Camp of Champions	07/16/05	380	5	1,900
Summer Research Internship Program	06/03/05	26	71	1,846
Fast Break Lacrosse	07/06/05	460	4	1,840
Girls Basketball Camp II	07/10/05	337	5	1,685
Reunions Weekend	06/03/05	400	4	1,600
Soccer Centers for Excellence	06/29/05	315	5	1,575
Boys Lacrosse Camp	06/18/05	390	4	1,560
Girls Basketball Camp I	06/19/05	280	5	1,400
Boys Basketball Overnight Camp	07/24/05	260	5	1,300
Virginia Bankers Association	07/31/05	215	6	1,290
Young Writers Workshop I	06/19/05	95	13	1,235
Summer Session I	05/16/05	40	27	1,080
Bridge Program for First-Year Incoming Minority Students	06/19/05	20	52	1,040
Center for Undergraduate Excellence Group	06/25/05	20	49	980
Headline Field Hockey Camp	07/09/05	230	4	920
Commonwealth Wrestling Camp I	06/25/05	180	5	900
Commonwealth Wrestling Camp IV	07/05/05	170	5	850
Research Experience for Undergraduates, Chemistry	06/03/05	12	65	780
Swim Camp II	06/19/05	130	6	780
Swim Camp III	06/26/05	130	6	780
Swim Camp IV	07/03/05	130	6	780
Summer Session III	07/12/05	25	32	800
Subtotal, 39 large programs itemized above		9,518	842	92,573
Subtotal, 89 smaller programs not itemized		7,161	766	31,134
Grand total		16,679	1,608	123,707

Source: Information dated March 1, 2006 from Conference Services of the Housing Division.

Note: Excludes staff accommodations for 24 of the programs enumerated in this table that amounted to 885 days and 10,513 staff days.

attend sponsored events. Based on information provided by the association, we estimated about 33,625 visitor-days in 2005. The events are listed in **Table 2.12** in order of relative size in terms of visitor-days.

**Table 2.12
Alumni Association Out-of-Town Visitors, 2005**

Event	Visitors	Visitor-Days
Homecoming Weekend	6,000	12,000
Midsummer's Weekend	3,000	6,000
Cumulative total for spring weekends	2,340	4,680
Reunions Weekend	1,800	4,500
Black Alumni Reunion	700	1,750
Cumulative total for non-football fall weekends	720	1,440
Other reunions	450	1,125
Thomas Jefferson Society Reunion	300	900
Homecoming volunteers	300	750
Alumni Family Weekend	240	480
Total	15,850	33,625

Source: Alumni Association of the University of Virginia.

Homecoming Weekend draws the largest number of visitors followed by Midsummer's and Reunions weekends, with other meetings and reunions accounting for the remainder. No detailed information is available concerning the percentage of visitors staying overnight; however, the Alumni Association provided a rough estimate that 40 percent of visitors were either Charlottesville residents or were only day visitors. These were excluded from data shown in Table 2.9; for the remaining 60 percent we calculated spending using the Monticello study visitor-spending data. We estimated total spending of \$3,766,337.

ATTENDEES AT OFFICE OF ADMISSION EVENTS

The admission process at the University brings an estimated 32,388 prospective students and their parents to Charlottesville. The largest number of visitors comes for the tour and information sessions. Again the lack of concrete data made estimation necessary. The Admission Office estimates that 80 percent of visitors are from outside the Charlottesville MSA. Our conservative estimate was that 25 percent of that 80 percent stays in Charlottesville overnight. When calculating spending, only spending of overnight guests was included because there is no reliable way to determine the spending of day visitors who may stay all day or may go on to other colleges and universities in the region. The number of visitors presented here likely under-represents the number of admission visitors because only visitors who attended the information sessions in Peabody Hall were counted, not those only taking the tour.

Once admission decisions are made, the Admission Office holds several sessions called "Days on the Lawn." These programs are designed to entice admitted students to matriculate. As before, we used the 25-percent-of-80-percent formula when calculating spending. Based on visitor-day spending in a previously cited Monticello study, we estimate the total spending by out-of-town visitors was \$725,601 for tours and information sessions and \$92,968 for "Days on the Lawn" (**Table 2.13**).

**Table 2.13
Overnight Visitors at Office of Admission Events, 2005**

Event	Total Visitors	Overnight Visitors		Spending (\$)
		Visitors	Number of Visitor-Days	
Tours and information sessions	32,388	6,478	6,478	725,601
Days on the Lawn	4,150	830	830	92,968
Orientation	3,868	3,868	7,736	866,509
Total	40,406	1,176	15,044	1,685,078

Source: Information from the Office of Admission combined with authors' estimate of \$112.01 spending per visitor-day.

Once students have enrolled, they are required to attend summer orientation prior to the fall session. Orientation lasts two days, during which students stay in dormitories and eat in the University dining halls. Most students bring at least one parent with them. We were able to get a very reliable figure for orientation guests because all students and parents are required to register for Orientation.

The Office of New Student Orientation provided us with a list of all parents who had registered. We assume that unless they were local residents, all parents stayed in hotels. To account for local parents who would likely return home each night we removed all parents with addresses in Charlottesville and the surrounding areas of Afton, Barboursville, Crozet, Earlysville, Fork Union, Louisa, Madison, North Garden, Orange, Palmyra, Staunton, and Waynesboro. We calculated visitor spending for the remaining 3,868 parents using the Monticello data for 7,736 visitor-days. The total amount spent by parents attending orientation was \$866,509. Thus, combined visitor spending for orientation and Office of Admission events was \$1,685,078 (**Table 2.13**).

MEDICAL CENTER OUT-OF-TOWN PATIENTS AND THEIR FAMILIES

Out-of-town patients receiving outpatient medical treatment and the attending families of out-of-town patients constitute an important component of local visitor spending attributable to the University. To assist

some of the patients and their families, the University operates Hospitality House, a facility with a total of thirty-five beds and two fully equipped kitchens and five one-bedroom apartments. In calendar year 2005, Hospitality House provided housing for about 1,750 people with an average stay of 4.6 nights. Because these facilities can accommodate only a fraction of the total demand, the Medical Center's Lodging Services operates a referral service for participating hotels/motels that provide a discount for patients and their families.

Recently, Lodging Services began keeping records of referrals. In the first five months of 2006, referrals averaged 1,713 per month. Each time the desk person at Lodging Services answers the phone, the call is tallied. Sometimes the desk person calls a motel/hotel on behalf of the caller. In such cases there is double counting. Also, no tally is kept of the number of persons in each party.

In order to estimate spending by persons referred to one of the participating lodging facilities, we assumed that one-half of the calls involved double counting. The average number of calls per month was multiplied by 0.75 to obtain an adjusted figure of 1,285. On an annual basis this amounted to 15,420 visitors even after making the conservative assumption that each call represented only one visitor. The number of visitor-days was estimated by multiplying the number of visitors by 4.6, the average stay at Hospitality House. The estimated annual number of visitor-days, excluding visitors using Hospitality House facilities, was 70,932. Based on visitor-day expenditures from the Monticello study, we estimate that each visitor spent \$112.01 per day for a total of \$7,945,093.

DARDEN EXECUTIVE EDUCATION PARTICIPANTS

The Darden Graduate School of Business Administration offers on-campus executive programs that attract participants who reside for short periods of time in the Charlottesville MSA. In FY 05 there were 3,220 attendees who spent a total of 17,301 nights at the Darden Sponsors Executive Residence Center. The participants paid \$230 per day for food and lodging for a total of \$878,176. Some additional room-nights were booked at the Omni, the Courtyard Marriott, and the Residence Inn. The total spent by participants for these additional room-nights was about \$30,000. This amount was entered in the regional planning model along with estimates of participant nonfood and lodging expenses based on the Monticello study, totaling \$728,787. The previously mentioned \$878,176 was not counted in

our estimate of visitor spending because the University already incorporated it in expenditures.

CONTINUING MEDICAL EDUCATION PARTICIPANTS

The Medical Center's Department of Continuing Medical Education provides one- to three-day courses for physicians and many other types of health care professionals including nurses, nurse practitioners, physicians' assistants, medical technicians, psychologists, pharmacists, dentists, and social workers.

In calendar year 2005 there were sixty-four course offerings with over seven hundred hours of instruction provided. More than two thousand physicians and 1,500 other health care professionals participated. About 90 percent of the classes were provided in Charlottesville or Albemarle using U.Va. or private conference facilities. Most participants, except those attending one-day classes, stayed in local lodging establishments. Registration fees do not cover accommodations or meals except for continental breakfasts and some banquets. Consequently, spending for hotels and motels, outside meals, entertainment, and vehicle use is not captured in the registration fees and other conference expenses, which generally are close to \$1 million annually. Using information provided by the Department of Continuing Medical Education, we estimated 1,800 out-of-town physician participants and 1,350 out-of-town other healthcare professionals who attended programs in Charlottesville in 2005. Since the average stay was two days, there were 6,300 participant-days. Based on the Monticello study results, total spending was \$705,663.

FESTIVAL ATTENDEES

The Virginia Festival of the Book and the Virginia Film Festival are two local festivals that are affiliated with the University. Calculating visitors to these festivals is difficult because no visitor counts are made. For this reason, we have tried to make conservative estimates.

Virginia Festival of the Book

With the advice of festival organizers, we have estimated 31 percent of a total 8,500 individual visitors were from outside the Charlottesville MSA. The most recent festival ran from March 22 to March 26, 2006. It would be unreasonable to assume that all out-of-town visitors stayed for the entire five days of the festival. To make spending calculations we assumed that the average stay was two days. Visitor spending was calculated for only the out-of-town visitors and for presenters at the festival. We estimate that the 2,635 out-of-town visitors

and 338 presenters at the book festival spent \$666,011 locally, based on spending of \$112.01 per day per person and an average two-day attendance.

Virginia Film Festival

Calculating visitors for this festival was particularly difficult because the only attendance information available was the number of tickets sold. This forced us to make assumptions about the number of individual visitors. We made the assumption that over the four-day festival each visitor attended five screenings. Dividing the total number of tickets sold by five gives us the number of individual visitors. To calculate visitor-days we multiplied the total number of visitors by the festival length. The festival organizers estimate that 55 percent of visitors were local while the remaining 45 percent were from outside the Charlottesville MSA. Spending was calculated only for attendees from outside of the MSA, who accounted for an estimated 4,172 visitor-days and local spending of \$467,306.

SCHOOL OF CONTINUING AND PROFESSIONAL STUDIES EXECUTIVE DEVELOPMENT PROGRAM PARTICIPANTS

The school offers about fifteen five-day programs in the local area, with about thirty-two participants in each program. This works out to 2,400 participant-days. Nearly all of the participants are federal employees, who spend a minimum of the federal per-diem rate on lodging and meals, which is \$112 per day in Charlottesville. In addition they spend on rental cars and free-time activities. To develop a total expenditure estimate of \$365,736, we multiplied the federal per-diem rates for lodging (\$78) and meals (\$34) by the total number of participant-days. Other expenditures were estimated by using the amount for that category in the Monticello study (\$40.39).

JOHN PAUL JONES ARENA SPECTATORS

The new John Paul Jones Arena (JPJA) opened with its first performance on August 1, 2006. The arena, which has a capacity of sixteen thousand spectators including suites and floor seating, is managed by SMG, a large company involved in facility management, marketing, and development. SMG is a joint venture of the Hyatt Hotel Company and ARAMARK Corporation.

The multi-purpose sports and entertainment facility houses men's and women's basketball games, other University events, and numerous shows. The arena will undoubtedly have a positive economic impact on the Charlottesville metropolitan area, principally because of spending by out-of-town visitors. The share of spectators

from outside the local area will vary depending on the type of event and whether the event is also scheduled for nearby areas. Also, JPJA will cause some "import substitution" as local residents substitute attendance at JPJA events for previous spending on events outside the local area.

However, until the arena has been in operation a couple of years, it will be too early to estimate the economic impact. Big shows already held include Cirque du Soleil's *Delirium*, James Taylor, Kenny Chesney, Dave Matthews Band, Eric Clapton, *Disney on Ice*, Lipizzaner Stallions, and the Ringling Brothers Circus. Many of the shows, which are expected to number about sixty-five per year, will draw audiences mainly from the local area. However, some of the big shows, if booked exclusively in Charlottesville, are expected to attract large numbers of spectators from outside the local area, especially from the Richmond area and the Shenandoah Valley.

Very big shows might draw from even more distant markets including Northern Virginia, Hampton Roads, Roanoke, and Lynchburg. The visitors from outside the local area are likely to spend locally for food, drinks, parking, and curios at the arena, and some will make purchases of meals and gas or they may spend the night in local hotels and motels. Local businesses also will benefit from the spending of performers and their support crews. For example, when *Disney on Ice* came to town for a five-day stay, there were about sixty performers and 125 support personnel, and all required local meals and lodging.

CULBRETH THEATER PATRONS

The University's Culbreth Theater and its summer program, the Heritage Repertory Theatre, provide dramatic performances throughout the year. The theater adds to the nucleus of local performing venues afforded by the Live Arts Theater, the Paramount, the Charlottesville Pavilion, the Martin Luther King Jr. Performing Arts Center of Charlottesville, and the summertime Ash Lawn Opera Festival. The majority of Culbreth patrons reside in the local area, but it does attract some out-of-towners, especially local visitors who decide to add attendance at the Culbreth to their activities.

VISITOR SUMMARY

The preceding sections illustrate the importance of U.Va.-associated visitors in the Charlottesville area. **Table 2.14** summarizes the estimates in terms of number of visitors, number of visitor-days, and spending.

Table 2.14
Summary of University Visitors, 2005

Visitor Type	Visitors	Visitor Days	Local Spending	
			Amount (\$)	Percent of Total
Visitors of faculty and staff	158,663	633,214	51,387,389	42.1
Visitors of students	193,374	435,622	35,607,814	29.2
Season ticket holders for athletic events	30,123	207,852	13,795,033	11.3
Medical Center out-of-town patients and their families	15,420	70,932	7,945,093	6.5
Conference attendees ^a	16,679	123,707	4,948,280	4.1
Alumni Association events	15,850	36,625	3,766,337	3.1
Admission events (overnight visitors only)	11,176	15,044	1,685,078	1.4
Darden Executive Education Programs ^a	3,220	17,301	728,787	0.6
Continuing medical education participants	3,150	6,300	705,663	0.6
Book festival	2,973	5,946	666,011	0.5
Film festival	1,043	4,172	467,306	0.4
School of Continuing & Professional Studies Executive Development Programs	480	2,400	365,736	0.3
John Paul Jones Arena	n.a.	n.a.	n.a.	n.a.
Total	452,151	1,556,115	122,068,527	100.0

Note: Detail may not add to totals due to rounding.

n.a. = not available.

a. Does not show expenditures for lodging and food because they are included in University expenditures.

Supplementary evidence of the University's importance in attracting visitors comes from two other sources. (1) A recent student survey of local motels and hotels found that managers characterized 17 percent of all room rentals as U.Va.-connected.¹⁰ (2) According to the former executive director of the Charlottesville-Albemarle Airport Authority, the airport has a high number of enplanements and deplane-

10. U.Va.-connected was defined as visitors of faculty, staff, and students; spectators at U.Va. athletic events; participants at U.Va.-sponsored training courses and conferences; patients of the Medical Center and their families; and participants at U.Va.-sponsored entertainment, arts, and cultural events. Charles Lindsay Hopkins, editor, "The Economic Impact of the University of Virginia on the Charlottesville Area." (Class paper, Spring 2006).

ments relative to the population size of the community. In his view, this is indicative of the importance of the University in generating traffic. Also, air traffic peaks generally follow the University's academic and athletic calendars.¹¹ (3) According to a 2006 customer satisfaction survey sponsored by the Airport Authority, one-third of the respondents answered that their travel was connected to the University. The nature of the connection is shown in **Table 2.15**. More than one-third of the air travelers with a University connection were students, faculty, or staff. In addition, recruiting or training and guest speakers, lecturers, and researchers accounted for more than one-fourth of visitors.

Table 2.15
Airport Travelers Whose Travel Was U.Va.-Connected, 2006

Type of Connection with U.Va.	Percent of Total
Student	19.3
Faculty/staff	15.1
Recruiting or training	14.7
Guest speaker, lecturer, or researcher	12.6
Visitor of a student	8.0
Prospective student or employee	7.6
Vendor, contractor, or consultant	5.9
Conference, business, or meeting attendee	5.5
Entertainment or sports	5.0
Other	6.3
	100.0

Source: Center for Survey Research, Weldon Cooper Center for Public Service, Charlottesville/Albemarle (CHO) Airport Customer Satisfaction Survey (November 2006), p. A-8.

UNIVERSITY CAPITAL OUTLAY

The University is constantly upgrading and expanding its infrastructure. In recent years, the largest projects were the John Paul Jones Arena, the Scott Stadium expansion, the Biomedical Engineering and Medical Science Building, the Darden School expansion, and the Clark Hall renovation. In the decade from FY 96 to FY 05

11. Email from Bryan Elliott, Executive Director, Charlottesville-Albemarle Airport Authority (March 27, 2006).

Table 2.16
University Capital Construction and Equipment Spending in the Charlottesville MSA, FY 96 to FY 05

Fiscal Year	(Millions of Dollars)									
	Academic Division			Medical Center			Health Services Foundation		Total	
	Construction	Equipment	Total	Construction	Equipment	Total	Construction	Construction	Equipment	Total
2005	119	25	144	40	45	85	2	161	70	231
2004	101	18	119	41	33	74	a	142	51	193
2003	72	30	102	27	29	56	a	99	59	158
2002	96	29	125	12	29	41	2	110	58	168
2001	102	28	130	9	27	36	a	111	55	166
2000	81	27	108	7	18	25	a	88	45	133
1999	55	25	80	8	19	27	1	64	44	108
1998	29	29	58	4	17	21	a	33	46	79
1997	37	29	66	6	14	20	1	44	43	87
1996	61	25	86	5	16	21	3	69	41	110
Total	753	265	1,018	159	247	406	10	922	512	1,434

Source: Office of Financial Analysis, Financial Analysis, Financial Statements NIP Schedule. Director of Finance, University Health Services Foundation. This table does not include expenditures of the University of Virginia Foundation. Note: Detail may not add to totals due to rounding. a. Less than \$1 million.

the University spent \$1.4 billion on construction and equipment (Table 2.16). Not all those dollars stayed in the community since most of the equipment and some of the labor came from other areas. Nonetheless, the local impact of construction dollars was important.

Capital spending will continue to be a major stimulant for the local economy in future years. According to current plans for the next eight years, such spending will total \$2.2 billion. Specific projects on the drawing board are shown in Table 2.17.

Table 2.17
University Capital Outlay Plans, 2006 to 2014

Project	Amount (\$)	Project	Amount (\$)
2006-2008 Biennium Plan		2008-2010 Biennium Plan (continued)	
South Lawn Project	105,000,000	Maintenance reserve	20,000,000
Carter Harrison Research Building	84,100,000	Fourteen other projects each less than \$20 million	95,581,000
Main Heating Plant environmental upgrade	68,200,000	Total	605,571,000
Rouss Hall renovation and expansion	57,000,000	2010-12 Biennium Plan	
Advanced Research and Technology Building	45,400,000	University Hospital master site plan development	117,000,000
ART Life Sciences Vivarium Annex	35,100,000	Life Sciences	67,900,000
Claude Moore Medical Education Building	30,000,000	Biomedical Engineering	66,400,000
Ivy Translational Research Building	30,000,000	Alderman Road Residence Halls - phase III	58,300,000
Jordan Hall HVAC replacement project	28,900,000	Fieldhouse and Athletic Offices	58,200,000
Ruffin Hall	25,922,187	University Recreation Center	56,300,000
South Chiller Plant expansion	22,500,000	Rotunda renovations	40,200,000
Eleven other projects each less than \$20 million	84,887,000	Maintenance reserve	22,000,000
Total	617,009,187	Academic Division blanket authorization	20,000,000
2008-2010 Biennium Plan		Medical Center blanket authorization	20,000,000
Gateway to the Arts	118,500,000	Eleven other projects each less than \$20 million	110,700,000
Information Technology Engineering Building	56,200,000	Total	637,000,000
JAG School addition	50,000,000	2012-14 Biennium Plan	
North Chiller Plant chillers replacement	45,300,000	New Psychology Building	63,200,000
Acquire Health System Parking Garage-North	43,000,000	Cobb Hall renovation	56,900,000
Alderman Road Residence Halls - phase II	34,500,000	Public Safety Building	29,500,000
University Center	30,000,000	Alderman Library renovations and upgrades - phase I	26,200,000
Ivy Stacks II	24,500,000	Maintenance reserve	24,000,000
Rugby Road Administrative Building renovation and Lambeth Colonnade restoration	24,100,000	Academic Division blanket authorization	20,000,000
University Hospital Mixing Box	23,890,000	Medical Center blanket authorization	20,000,000
Academic Division blanket authorization	20,000,000	Six other projects each less than \$20 million	43,100,000
Medical Center blanket authorization	20,000,000	Total	282,900,000
		Grand total	2,142,480,187

Source: University Budget Office, data based on plan approved by the Board of Visitors' Buildings and Grounds Committee on January 22, 2007.

TOTAL LOCAL SPENDING ATTRIBUTABLE TO THE UNIVERSITY

In this part of the chapter we aggregate information on local spending that has already been discussed—spending by the Academic Division, the Medical Center, major component units, students, and visitors.

Total local spending was well over \$1 billion, or \$1,124,538,470 to be exact (Table 2.18).

Table 2.18
University-Related Local Spending by Major Category, 2005

Category	Amount (\$)	Percent of Total
Academic Division ^a	482,128,023	42.9
Medical Center ^a	234,981,350	20.9
Component units ^{a,b}	73,487,095	6.5
Student spending	211,873,475	18.8
Visitor spending	122,068,527	10.9
Total	1,124,538,470	100.0

Source: Tables 2.2, 2.4, and 2.14.

a. Includes employee and institutional spending.

b. Health Services Foundation, Darden Foundation, and the Alumni Association.

Not all of the dollars spent in the Charlottesville MSA stay in the local economy. For example, employees are likely to spend significant portions of their incomes on products such as groceries, clothing, appliances, electronics, motor vehicles, fuel, and insurance that are produced largely outside the local area. This also applies to student outlays and to expenditures by the University. In economic terminology, the use of locally spent dollars to purchase goods and services from outside the local area is known as “spending leakage.”

To measure the leakage we used a well-known input-output model named IMPLAN.¹² When the IMPLAN model was applied to the \$1,124.5 million that was spent locally, it converted this amount into \$758.4 million of direct local expenditure. In other words, there was spending leakage of \$366.1 million. But the \$758.4 million of direct local expenditure had multiplier effects—payments to local vendors resulted in additional indirect local expenditures as the vendors hired labor and purchased local goods and services to fulfill their contractual obligations.

12. The acronym stands for “impact analysis for planning.” IMPLAN, which is a proprietary program of the Minnesota IMPLAN Group, Inc., is an outgrowth of work that started in 1984 for the U.S. Forest Service. <http://www.implan.com/about.html> (10/18/06)

Finally, there were still more expenditures as the recipients of vendor payments spent money locally. Such expenditures are called induced expenditures. The derivation of the University’s total impact of \$1,096.6 million is shown in Table 2.19.

Table 2.19
Total Impact of the University in 2005

Item	Dollars
Total local expenditures by the University, students, and visitors	1,124,538,470
Less spending leakage	366,105,875
Direct local expenditures by the University, students, and visitors	758,432,595
Plus indirect local expenditures	165,003,934
Plus induced local expenditures by payment recipients	173,150,755
Total local impact	1,096,587,284

The IMPLAN expenditure multiplier for U.Va. is found by dividing total local impact by direct local expenditures by U.Va., students, and visitors. The resulting multiplier is 1.45 (\$1,096.6 million divided by \$758.4 million). This means that for every dollar spent locally by the University, the ultimate local spending generated by that activity is \$1.45. This is a conservative estimate since in constructing the model we restricted expenditures to those that were made initially in the local area. University employees who live outside the Charlottesville MSA in communities such as the cities of Staunton and Waynesboro and the counties of Augusta, Buckingham, and Orange were excluded. Furthermore, we did not include expenditures of entities closely connected with U.Va. such as the U.S. Army’s Judge Advocate General’s Legal Center and School.

The 1.45 multiplier determined by this study is consistent with spending multipliers reported in other higher education studies. One article that compared results for nine studies found a range of 1.5 to 2.2 [Leslie and Brinkman, 1988]. A memo released by the Federal Reserve Bank of Boston that compared the results of several studies reported a multiplier of 1.1 for Duke University and a range from 1.8 to 3.1 for other schools [Nagowski, 2006].

UNIVERSITY EMPLOYMENT

In 2005, there were 95,300 non-farm payroll employees in the Charlottesville MSA, measured on a place-of-work basis. The University was by far the largest employer; its 19,487 employees accounted for 20.4 percent of the area’s total employment. The University employs 12,990 full-time and part-time salaried workers, 700 medical residents, and roughly 5,800 hourly workers

during the academic year (Table 2.20). The job count is higher than would be expected for an institution with 20,399 students¹³ because of the inclusion of the Medical Center, a facility that operates twenty-four hours a day, seven days a week.

Table 2.20
University Employment by Place of Work, 2005

Unit	Employment
Academic Division	
Full-time salaried	7,704
Part-time salaried	444
Hourly, non-student	1,110
Hourly, student	4,294
Total, Academic Division	13,552
Medical Center	
Full-time salaried	4,088
Part-time salaried	754
Medical residents	700
Hourly, non-student	393
Total, Medical Center	5,935
University total	19,487

Source: Office of Institutional Assessment and Analysis, *Data Digest* http://www.web.virginia.edu/iaas/data_catalog/institutional/data_digest/datadigest.htm (April 25, 2007); Human Resources, Academic Division; Medical Center Human Resource Information Systems.

Another indication of the importance of U.Va. to the local labor market is that compensation of University employees accounts for a large share of total earnings in the Charlottesville MSA. In calendar year 2004, the University's total compensation and benefits expenditure was \$929 million, 22 percent of total earnings by place of work in the MSA.¹⁴ The federal government's Bureau of Economic Analysis estimates total earnings by place of work in the MSA were \$4,241 million in 2004.

UNIVERSITY INVOLVEMENT IN COMMUNITY SERVICES

The University plays a major role in the local community as a user and, in many cases, as a provider of local services. The University is a major user of local police, fire, and emergency services as well as a generator of

13. 2005 fall head count enrollment, total on-Grounds. Source: Office of Institutional Assessment and Studies, *Data Digest* http://www.web.virginia.edu/iaas/data_catalog/institutional/data_digest/datadigest.htm (10/19/06)

14. Total compensation and benefits at U.Va. were \$929,266,000 in calendar year 2004, based on an average of FY 04 and FY 05 amounts, and total compensation by place of work in the MSA was \$4,241,396,000 in calendar year 2004. The MSA compensation figure includes employer contributions for social insurance and other types of benefits. Sources: Bureau of Economic Analysis Regional Economic Information System <http://www.bea.gov/bea/regional/reis/default.cfm?catable=AMSA06&series=AMSA§ion=2&areatype=MSA> (1/12/07) and *University of Virginia President's Report, 2004-05*, p. 55 <http://www.virginia.edu/president/report05/> (10/19/06)

municipal waste. The University also serves as an important provider of police, transit, and medical services, and the faculty, staff, and students are involved in numerous charitable activities benefiting the community. In this section we provide a detailed examination of the many ties between the University and the community.

POLICE

U.Va. operates its own police department with sixty uniformed police officers and fifty uniformed security officers. The University Police Department handles most day-to-day police work involving U.Va. property. The department works closely with the Charlottesville Police Department and the Albemarle County Police Department. They share the same 800 MHz radio system, and they use the same area dispatch system for police, fire, and rescue services. Also, they employ the same records management system, and they have reciprocal agreements so that U.Va. uses the services of the other police departments and the University provides assistance to them for events such as the Foxfield races and for security provided to visiting dignitaries. There are geographic areas of concurrent jurisdiction where University police work with city or county officers, even to the extent of joint patrols by foot and by cruiser. The department works with police in Charlottesville and Albemarle on Jefferson Area Drug Enforcement (JADE) and the area's Emergency Operations Plan. In fact, the University's Zehmer Hall serves as the operations center.

The department provides financial support for the law enforcement instruction program at Charlottesville-Albemarle Technical School (CATEC). That support is included in the payment that the University makes to the Emergency Communications Center (see below). In addition, the department works closely with the law enforcement instructional program at Piedmont Virginia Community College (PVCC) but does not provide financial support. U.Va. and the other local police departments recruit together, and all of their new recruits attend the state's police academy located on the grounds of the Blue Ridge Community College at Weyers Cave.

When there are large athletic, academic, or show events at U.Va., the department contracts with local police departments, local sheriff departments, the Charlottesville-Albemarle Regional Jail, the Virginia Commonwealth University Police Department, and the state

police for extra personnel for traffic control and security as required. For each event the University unit sponsoring the event reimburses the department. In FY 05, the University paid *local* police agencies \$156,922 for football games and \$23,529 for men's basketball.¹⁵ Additional sums were spent for graduation and for major entertainment events such as the Rolling Stones concert at Scott Stadium.

FIRE

The University does not operate a fire department. Instead, it relies principally on the Charlottesville Fire Department. By agreement between the city and Albemarle County, the fire department serves an urban ring, which extends approximately five miles outside the city limits. A strong mutual aid agreement exists between the city and the county. Most of the fire department's equipment is not specialized for fires that might occur at the University. An exception is special equipment and training for biological and chemical hazards associated with research and operations at U.Va. The presence of the University creates traffic congestion at the time of major events, a factor influencing response time. The University also has caused a higher population density because of the many private apartment buildings on Jefferson Park Avenue and near the Corner that house University students. High population density complicates the mission of the fire department.

In recognition of the service demands created by its presence, the University makes an annual voluntary payment to the city. In accordance with an agreement signed in 2001, the University bases its payment on a base amount of \$125,000 plus an allowance for annual increases or decreases in costs experienced by the fire department, not to exceed 5 percent.¹⁶ If the number of University-related incidents (calls, whether real or false) for the year exceeds one thousand, then the city is paid \$250 for each additional call. In calendar year 2005 the Charlottesville Fire Department had 6,488 incidents and of that number 795 were at the University. In FY 05 the University paid the city \$157,500.

The University has made a major effort to reduce the number of false alarms. That is why the number associ-

15. These amounts exclude payments to the Virginia State Police, the Virginia Commonwealth University Police, and the Emergency Communications Center.

16. Letter from Gary O'Connell, City Manager, to Leonard W. Sandridge, Executive Vice President and Chief Operating Officer, dated December 31, 2001.

ated with U.Va. has been fairly static and not subject to the \$250 penalty for exceeding the one thousand incident threshold. The Office of Environmental Health and Safety (OEHS) has worked closely with the fire department to reduce the number of false alarms.

The fire department directs the Regional Hazardous Materials Team, which is composed of representatives from the city, the county, and the University.

The temporary fire station on U.S. 250 West was established while the 5th Street Bridge was being repaired in 1993. The temporary station allowed for much faster response time for many University and other properties, so the city elected to keep it. Now the relocation of the station to University-owned property across from the Fontaine Research Park is being actively studied. Preliminary analysis indicates a better response time to the residential areas of U.Va. and to the heavily student-populated areas in the Jefferson Park Avenue and Fry's Spring corridor. The site also would be a good access point for county responses. Another item under study is a jointly operated city-county fire department. The study will explore every opportunity from functional consolidation to full consolidation. One noted and significant cultural difference is the varying level of volunteers between the city and county.

EMERGENCY COMMUNICATIONS

The University helps to fund the Charlottesville-UVA-Albemarle County Emergency Communications Center, which acts as the public safety answering point for the region. The center is an independent local agency, which is governed by a management board. The University has three representatives on the ten-person board (the Executive Vice President and Chief Operating Officer, the University Chief of Police, and the Director of Environmental Health and Safety). Also on the board are the city manager and the county executive, the police and fire chiefs for the city and the county, and a member representing the volunteer fire and rescue agencies. The University is a joint and equal partner along with the city and the county in this venture.

In 1984 there were several individual emergency communications centers in the Charlottesville-Albemarle area. At that time, the three police departments cooperated to create a combined emergency communications center. In the early 1990s, the emergency medical services (EMS) groups (Charlottesville-Albemarle, Western Albemarle, and Scottsville rescue squads) joined the

center. In 2005 the Albemarle County Department of Fire/Rescue came aboard, and the Charlottesville Fire Department followed it in January 2007.

The 911 center utilizes the latest in technology with its emergency telephone, radio communications, and mobile data systems. The center recently received the distinction of being designated as a nationally accredited emergency communications center by the Commission on Accreditation for Law Enforcement Agencies and by the Association of Public Safety Communications Officials International. In order to achieve this distinction the center had to meet or exceed 216 national emergency communications standards. The center is only one of fifty in the entire nation to receive this honor and only one of four within the Commonwealth of Virginia.

The University pays for 15.75 percent of the center's police administrative and operations budget and for 20 percent of the center's technical budget according to a formula based on population, number of crimes, and number of police call incidents associated with U.Va. (An incident is a call for which the center dispatches a police officer.) For the twelve months ending in September 2005 the University accounted for 11.4 percent of all incidents (Table 2.21).

**Table 2.21
Police Incidents Handled by the Emergency Communications Center, 12 Months Ending September 2005**

Jurisdiction	Incidents	Percent of Total
Charlottesville	55,236	45.8
Albemarle	51,630	42.8
University of Virginia	13,706	11.4
Total	120,572	100.0

The University's contribution to the center in the FY 05 budget was \$302,266. Included in this amount is funding for the local Office of Emergency Management, which is supervised by the executive director of the 911 center and is located in the Emergency Communications Center facility. The center's emergency management coordinator is responsible for maintaining, updating, and exercising the local emergency operations plan and is also accountable for implementing the plan during times of disaster and coordinating the local response. The coordinator acts as the liaison between local, state, and federal disaster officials. The coordinator is also responsible for emergency planning and development, public education, and conducting annual disaster exercises with the University, the city, and the county.

Although the University does not presently provide any funding to the center for fire and EMS dispatching, U.Va. currently has a contract with the city of Charlottesville for fire service that includes fire-dispatching costs. The center's executive director is presently working with financial representatives from the city, the county, and the University in developing a new funding formula that could incorporate fire and EMS costs in the University's funding share.

Currently, the city and the county cover the cost of EMS calls. In the FY 05 budget the city and the county shared the cost, paying 62 percent and 38 percent, respectively. When there are University events requiring additional communications officers, U.Va. reimburses the center via its police department. The police department then bills the University organizational unit creating the demand.

RESCUE

For a number of years the University has been a major contributor to the Charlottesville-Albemarle Rescue Squad (CARS). In FY 05 the University contributed \$30,000 to the squad. In addition, University personnel and students give a great deal of time to the squad. CARS' current volunteer roster lists 165 active members, with more than half affiliated with the University. There are twenty-six students who work with the squad and thirty-five U.Va. employees. A University physician serves as one of two operational medical directors. University people also work closely with the other rescue squads in the MSA. The Seminole Trail Volunteer Fire (and Rescue) Department has a current roster of sixty-three active members. Of this group, twenty-six are active U.Va. students and several others are University employees or part-time U.Va. students. In addition, a University physician volunteers as the medical advisor and as an associate member. Other local squads with significant numbers of U.Va. volunteers are the Western Albemarle Rescue Squad, the Wintergreen Property Owners Volunteer Rescue Squad, the Nelson County Rescue Squad, the Lake Monticello Rescue Squad, the Scottsville Rescue Squad, and the Greene County Rescue Squad.

UNIVERSITY TRANSIT SERVICE

U.Va. operates its own bus system, the University Transit Service (UTS), which is part of the University's Department of Parking and Transportation. The department provides approximately fifty-nine thousand hours of fixed route transit service and an additional ten thousand hours of service associated with events or charters. UTS routes make available frequent commuter service

from large University-owned parking areas to Central Grounds and to the Medical Center. Service is also provided along two adjacent corridors which have dense off-Grounds student residences (Jefferson Park Avenue and the Rugby-Grady-14th Street area). Annual passenger counts for UTS total approximately 2.9 million.

UTS works closely with Charlottesville Transit Service (CTS) on a number of operational initiatives including (1) UTS provides an annual subsidy for the operation of the Charlottesville Free Trolley Route. The trolley route provides free fifteen-minute service linking the Downtown Mall with Central Grounds. The annual subsidy provided by Parking and Transportation to the city of Charlottesville in FY 07 is \$50,000 and is projected at \$55,000 for FY 08. (2) UTS and CTS have worked together on three demonstration months of open ridership for U.Va. faculty, staff, and students on CTS. In October 2005, April 2006, and October 2006, University employees and students could show U.Va. identification and ride any CTS route without paying the fare. At the end of each demonstration month, CTS tallied the number of riders showing an ID and billed the University for the services. The first two months of the project, approximately ten thousand rides were attributable to the project. In the final month, the number of riders approximately doubled. Data from the demonstration months were used to negotiate a permanent open ridership program on CTS. The University payment for FY 08 will be \$130,000 with the amount for future years to be negotiated based on ridership and other transit conditions. (3) CTS and the city offer parking and transit options for home football games. A special season parking pass is available for the Market and Water Street garages for the football season and a special "football shuttle" is operated by CTS. U.Va. provides marketing and administration of this program through season ticket mailings and through contact with visiting teams' ticket offices. The University also provides a loading/unloading area within the street network that is restricted on football game days.

STUDENT HOUSING INSPECTION

The majority of U.Va. students, about 70 percent, are housed in private, off-Grounds housing. Because of the University's concern about the safety of student housing not under its direct control, it paid for the city of Charlottesville to hire a property maintenance inspector for a trial period from January 1, 2005, through January 31, 2007. The inspector focused on enforcement of building maintenance requirements in the city code

and the Virginia Uniform Statewide Building Code for private housing occupied by U.Va. students. Both the University and the city agreed the trial was a success; they then agreed to a long-term contract through June 30, 2012, whereby the University reimburses the city for employing an inspector at an annual base rate of \$46,846, including benefits.¹⁷ The base rate will be increased each July at the same rate as that received by other city employees.

SOLID WASTE DISPOSAL

The University's share of local municipal solid waste is about 8 percent, according to the Rivanna Solid Waste Authority (RSWA), which serves Charlottesville and Albemarle. The University contracts with Waste Management, Inc., to collect trash and transport it to the Ivy Materials Utilization Center (known as the Ivy Center). Under a separate agreement with the authority, Waste Management transports the compacted waste to its Amelia landfill, where it is buried. Included in Waste Management's charge to U.Va. is a \$4-per-ton tipping fee paid to RSWA. The tipping fee is 20 percent less than the \$5 per ton paid by the company for other trash handled through the Ivy Center. The University's preferential rate is based on a ten-year agreement made in 1998 between RSWA and the company. According to RSWA's FY 07 budget, tipping fees from U.Va.-generated trash will total \$25,000.

The Ivy Materials Utilization Center closed to municipal waste in 1998 and to construction and demolition debris in 2001, as existing permitted cells were filled and it became clear that Virginia Department of Environmental Quality (DEQ) conditions for opening new cells on the site would be financially unattractive. RSWA and DEQ will monitor the closed site for at least thirty years or until they determine that decomposition of the landfill waste mass is essentially complete and the site is environmentally safe. Starting last year, the University has agreed to pay a portion of the costs of pollution mitigation under a schedule with a declining amount each year. In FY 07 the University's payment will be \$235,000.

The University of Virginia's Division of Recoverable and Disposable Resources guides material recovery, recycling, and reuse activities; manages the trash collection and disposal program; identifies opportunities

17. "Agreement for Funding of City of Charlottesville Property Maintenance Inspector Position." (No date.)

for reducing the disposal of materials in landfills; and actively works with faculty, staff, and students to promote conservation. In FY 05 the University diverted 41 percent of its municipal solid waste from the landfill through its recycling and reuse programs. This outcome was very favorable when compared to a total recycling rate of 31 percent for all of the authority's service area.

CHARITABLE ACTIVITIES

The University of Virginia community has an impressive record of community service. Students, staff, and faculty all contribute large amounts of time and money to help others. One cannot walk across the Grounds on most days without noticing such fund-raising efforts as a pancake breakfast for court-appointed special advocates, a hand of poker for childhood cancer research, or a whiffle ball game for the rescue squad. Students spend time as soccer and reading coaches, Girl Scout leaders, Big Brothers, and Big Sisters. They dance, pole-sit, gamble, and race to support local community needs. Sports teams, sororities, and fraternities all set aside time to help the community by giving a hand or by raising money.

Madison House, a campus clearinghouse for volunteer opportunities, recorded over 115,000 hours of student community service in 2005: mentoring the young, aiding the poor, and comforting the elderly. In addition, the Virginia Service Coalition lists seventy-one service organizations on campus. A number of these appear to be quite active. For example, the Alpha Phi Omega co-ed service fraternity reports one hundred members who, collectively, provided more than two thousand hours of community service in 2005.

Faculty and staff also contribute to the community through their churches and civic organizations, and on their own. Faculty and staff donate considerable amounts of both money and time to local, regional, and global charities. The University of Virginia faculty and staff donated approximately \$788,000 to the Commonwealth of Virginia Campaign in 2006. About 25 percent of full-time salaried employees participated in recent campaigns. Much of this money stays in the local community, providing assistance to social service agencies and charities. In addition, each year U.Va. employees participate in a day of community service known as the United Way Laurence E. Richardson Day of Caring. Participants in the Day of Caring contribute to the community through a variety of activities, ranging from landscaping and painting to reading to children and visiting with elderly residents. During the September 20, 2006, Day of Caring, 45 percent of the 2,100 total participants were U.Va. employees. The U.Va. participants included 522 Academic Division and 428 Health System employees. The 2006 U.Va. participation level represented a 40 percent increase from the number of participants in 2005.

MEDICAL CENTER PROGRAMS

The Medical Center serves as a teaching hospital for the School of Medicine as well as a provider of specialized care for many illnesses and injuries. In the process of performing these functions, the center provides a great deal of service to residents of the metropolitan area. In FY 05 outpatients from the local area numbered 86,021 and accounted for 45.1 percent of the total number of outpatients served (**Table 2.22**), and many of these outpatients made multiple visits. The average patient

Table 2.22
Patient Loads at the Medical Center, FY 05

Locality	Outpatient			Inpatient ^a		Emergency Room		
	Visits ^b	Patients ^c	Visits Per Patient	Patients ^c	Patient-days ^d	Visits ^b	Patients ^c	Visits Per Patient
Charlottesville MSA								
Charlottesville	143,851	40,311	3.57	2,457	19,945	15,315	9,931	1.54
Albemarle	88,923	23,479	3.79	2,518	19,548	10,770	6,606	1.63
Fluvanna	24,240	7,635	3.17	781	6,091	3,013	2,041	1.48
Greene	18,170	5,614	3.24	582	4,800	3,005	2,099	1.43
Nelson	34,291	8,982	3.82	716	6,279	2,741	1,804	1.52
Total MSA	309,475	86,021	3.60	7,054	56,663	34,844	22,481	1.55
All other	287,918	104,543	2.75	15,371	110,241	22,505	17,086	1.32
Grand total	597,393	190,564	3.13	22,425	166,904	57,349	39,567	1.45

Source: Medical Center Controller's Office.

a. Excludes normal newborns.

b. Includes multiple visits by the same patient.

c. Each patient is counted only once.

d. Total number of days in the hospital spent by patients.

from the metropolitan area made 3.6 visits. Other patient-load measures also show the center's importance as a health care provider for people living in the MSA. People from Charlottesville and the other localities in the metropolitan area accounted for 33.9 percent of inpatient patient-days and 60.8 percent of emergency room visits.

The Medical Center provides a significant amount of indigent care for the local community and the rest of the state. In FY 05, \$11.8 million of service to Charlottesville MSA inpatient indigents was absorbed by the center (Table 2.23). That amount accounted for 31.1 percent of the total write-off for inpatient indigent care. Similarly, the Medical Center provided \$15.8 million of outpatient indigent care to local residents, representing 37.4 percent of total write-offs for outpatient indigent care.

**Table 2.23
Medical Center Indigent Care, FY 05**

Locality	Inpatient (\$)	Outpatient (\$)	Total (\$)
Charlottesville MSA	11,750,292	15,834,027	27,584,319
Charlottesville	4,537,617	5,652,702	10,190,319
Albemarle	3,698,262	5,459,629	9,157,891
Fluvanna	1,655,203	1,482,395	3,137,598
Greene	791,412	1,411,303	2,202,715
Nelson	1,067,798	1,827,998	2,895,796
Remaining Virginia	23,504,175	25,141,666	48,624,789
Rest of the nation	2,540,918	1,347,427	3,909,397
International	27,267	9,284	36,551
Total	37,822,652	42,332,404	80,155,056

Source: Medical Center Controller's Office.

The Medical Center conducts many outreach programs in the local area. The programs are grouped into four major categories: community-based screenings, health outreach, consumer health information, and U.Va. Children's Hospital safety and wellness programs.

The screening program is an ongoing effort to provide prevention, education, and screening services. In FY 05 there were twenty-one events. For the sixteen events for

which we have complete information, there were 1,469 participants. Examples include Westhaven Community Day, which provided 300 pediatric athletic physicals, prostate cancer screening for 261 participants, skin cancer screening for 191 participants, and abdominal aortic aneurysm screening for 127 participants.

Health outreach provides ongoing health and safety education. In FY 05 there were thirty-four events with 7,933 participants. The participant total is understated because there were only twenty-two events for which a participant count exists. By far the largest event was the Red Dress Campaign, a program focused on the vulnerability of women to heart disease, involving 5,400 participants.

Consumer health information was provided to 1,130 participants at four events. The largest event was the celebration of National Emergency Services Week, which involved eight hundred participants.

U.Va. Children's Hospital organized thirty-two events involving 6,198 participants. The events promoted safety and wellness and provided injury prevention strategies and education.

THE UNIVERSITY AND LOCAL GOVERNMENT FINANCES

Because of its importance in the local economy, the University has a significant impact on local government finances. In this section we review several aspects of the impact, including tax-exempt property, taxable real property belonging to the University of Virginia Foundation, public service charges paid by the University, and real estate taxes paid by faculty, staff, and students in relation to public education services received.

Tax-Exempt Real Property

Under Virginia law, the University is not required to pay local taxes on its real property used for academic purposes. In tax year 2005 this exemption amounted to

Table 2.24**Tax-Exempt Property Owned by the University and the University of Virginia Foundation, 2005**

Owner/Location	Year Property Valued	Land (\$)	Buildings (\$)	Total (\$)	Forgone Taxes Based on Local Tax Rates in 2005 ^a (\$)
University of Virginia					
City of Charlottesville					
	2005	11,601,000	13,767,500	25,368,500	266,369
	2003	424,200	138,500	562,700	5,908
	2002	11,531,900	35,338,500	46,870,400	492,139
	2001	18,708,300	243,463,100	262,171,400	2,752,800
	2000	5,690,000	72,861,800	78,551,800	824,794
	1995	4,450,200	22,270,500	26,720,700	280,567
City of Charlottesville, total		52,405,600	387,839,900	440,245,500	4,622,578
Albemarle County					
	2003	7,998,200	16,153,000	24,151,200	178,719
	2001	91,458,500	793,424,059	884,882,559	6,548,131
	2000	3,265,800	16,872,300	20,138,100	149,022
Albemarle County, total		102,722,500	826,449,359	929,171,859	6,875,872
City-county total		155,128,100	1,214,289,259	1,369,417,359	11,498,450
U.Va. Foundation					
City of Charlottesville	2005	2,480,300	4,136,700	6,617,000	69,479
Albemarle County	2005	1,786,400	1,833,400	3,619,800	26,787
City-county total		4,266,700	5,970,100	10,236,800	96,266

Source: Facilities Management Department of Space and Real Estate Management and University of Virginia Foundation Director of Financial Services.

a. In calendar year 2005 the local property tax rate was \$1.05 per \$100 of assessed value in Charlottesville and \$0.74 in Albemarle.

\$4.6 million of forgone tax revenue for Charlottesville and \$6.9 million for Albemarle County (Table 2.24). These estimates are rough because (1) there are no current assessments for many of the properties, necessitating the use of valuations made as long ago as 1995, (2) the valuation of many of the properties owned by the University is inherently difficult because often there are no equivalents in the private sector, and (3) there is no incentive for local governments to make detailed assessments of properties that are not taxed. Also shown in Table 2.24 is information on tax-exempt property belonging to the University of Virginia Foundation. Relative to the University's holdings, the Foundation amounts are small.

Taxable Real Property

The University of Virginia Foundation does pay taxes on its properties not used for academic purposes. Properties that are taxable include several in the two research parks and the Boar's Head Inn/Birdwood Golf Course. In tax year 2005 the foundation paid Charlottesville and Albemarle property taxes totaling \$189,694 and \$1,149,487, respectively (Table 2.25). Furthermore, all property owned by faculty, staff, and students is subject to taxation.

Table 2.25**Local Real Estate Property Taxes Paid by the University of Virginia Foundation, Tax Year 2005**

Property	Assessed Value (\$)	Tax Rate ^a	Tax
Charlottesville City			
Meadow Creek ^b	6,125,000	1.05	64,313
Brandon Avenue Properties	4,577,600	1.05	48,065
Emmet Street Properties	3,195,600	1.05	33,554
West Main/JPA Properties	2,351,200	1.05	24,688
Valley Road Properties	1,021,900	1.05	10,730
All other	794,700	1.05	8,344
Total, Charlottesville	18,066,000		189,694
Albemarle County			
Fontaine Research Park	43,349,600	0.74	320,787
Boar's Head/Birdwood	39,869,000	0.74	295,031
U.Va. Research Park	38,380,900	0.74	284,019
Blue Ridge Hospital	8,922,500	0.74	66,027
Boar's Head Offices	6,743,300	0.74	49,900
Westover	2,854,200	0.74	21,121
Morven Farms ^c	1,903,600	0.74	14,087
All other	13,312,900	0.74	98,515
Total, Albemarle	155,336,000		1,149,487
City-county total	173,402,000		1,339,181

Source: University of Virginia Foundation Dir. of Financial Services.

a. Tax rate per \$100 of assessed value.

b. Cavalier Inn-Best Western and Espresso Italian Villa Restaurant.

c. Morven Farms does not include the Core Property valued at approximately \$24 million as this was not assessed to the Foundation until January 2006.

Service Charges

Virginia law does provide an exception to tax exemption for University-owned faculty and staff housing.¹⁸ In lieu of the real property tax, the *Code of Virginia* permits a local service charge. The charge is based on the local tax rate adjusted downward for the value of local public services not provided to the property. In 2005 the University paid the city of Charlottesville \$33,158 for seven properties with a total assessed value of \$3,349,300 and the county of Albemarle \$105,047 for twenty properties with a total assessed value of \$19,099,800 (Table 2.26).

Table 2.26
Service Charges Paid by the University, CY 2005

Property	Assessed Value (\$)	Service Charge	
		Rate ^a	Amount (\$)
Charlottesville			
Morea at 209 Sprigg Lane	1,575,900	0.99	15,601
Montebello at 1700 Stadium Road	559,500	0.99	5,539
Five other properties, total	1,213,900	0.99	12,018
Total, Charlottesville	3,349,300		33,158
Albemarle County			
Central Grounds East (12 parcels)	9,576,400	0.55	52,670
Carr's Hill	3,878,500	0.55	21,332
Piedmont properties	3,142,700	0.55	17,285
Piedmont Townhouses	793,000	0.55	4,362
Birdwood Mansion Area	637,500	0.55	3,504
Faulkner Property	482,200	0.55	2,652
Three other properties	589,500	0.55	3,242
Total, Albemarle	19,099,800		105,047
City-county total	22,449,100		138,205

Source: Office of Financial Analysis.

a. Per \$100 of assessed value

The most valuable properties were the Morea residence in the city; and in Albemarle County's jurisdiction the Pavilion Houses on the Lawn; Carr's Hill, the president's home; and the Piedmont Faculty Houses.

Real Estate Taxes Paid by University Faculty, Staff, and Students and Public Education Services Received

With the notable exceptions of police, fire, emergency communications, and waste management, U.Va. does not contribute directly to local government except for the

18. *Code of Virginia*, Section 58.1-3403.

previously mentioned payments in lieu of taxes. However, faculty, staff, students, and visitors pay substantial amounts of local taxes. In particular, faculty, staff, and students pay local taxes on real estate (as owners or as renters, assuming the tax is shifted from property owners to renters), retail sales, utilities, and meals. Visitors pay taxes on retail sales as well as meals and lodgings. In addition, tax revenue is generated from the induced and indirect spending that was described earlier in this study.

It is beyond the scope of this study to provide detailed estimates of taxes paid to local governments and benefits received; but in regard to public education, the largest cost of local government, some numbers are available for Charlottesville and Albemarle, the two local areas most impacted by the University. Based on the faculty and staff and student surveys, the total taxable value of real estate owned or rented by faculty, staff, and students is approximately \$3.3 billion, yielding \$28.3 million in property tax revenue, divided nearly equally between the two jurisdictions. (Table 2.27, see page 36) Real estate taxes, although the most important source of local tax revenue, are not the only source. In Charlottesville they accounted for 48.7 percent of tax revenue in FY 05; and in Albemarle, the percentage was 57.9 percent.

For Charlottesville, real estate property taxes paid by faculty, staff, and students in FY 05 amounted to \$13.4 million—a little more than the \$11.1 million cost of local public education for their children. For Albemarle, which has about double the number of public school children attributable to U.Va., real estate taxes paid by faculty, staff, and students were \$14.7 million, less than the \$22.2 million spent for their education. Thus, real estate tax collections made a major contribution toward funding of public education, but in Albemarle County the amount collected was less than the local cost of education for students attributable to the University.

If information were available for other taxes paid by faculty, staff, and students and taxes generated by University spending, the result would likely show that local government expenditures related to the University are more than covered by the taxes generated by its presence.

Table 2.27
Real Estate Property Taxes Paid by Faculty, Staff, and Students in Relation to Local Public Education Outlays, 2005

Item	City of Charlottesville			Albemarle County			Students, Faculty, and Staff, City-County Total
	Faculty and Staff (\$)	Students (\$)	Total (\$)	Faculty and Staff (\$)	Students (\$)	Total (\$)	
Value of owner-occupied housing	393,600,000	210,000,000	603,600,000	1,337,830,000	278,250,000	1,616,080,000	2,219,680,000
Value of rental property ^a	119,474,168	555,670,611	675,144,779	130,259,733	234,386,880	364,646,613	1,039,791,392
Total value of real property	513,074,168	765,670,611	1,278,744,779	1,468,089,733	512,636,880	1,980,726,613	3,259,471,392
Tax rate per \$100	1.05	1.05	1.05	0.74	0.74	0.74	
Real estate tax	5,387,279	8,039,541	13,426,820	10,863,864	3,793,513	14,657,377	28,284,197
Real estate tax share of total	48.7%	48.7%	48.7%	57.9%	57.9%	57.9%	
Public school students	1,099	357	1,456	2,722	420	3,142	4,598
Public school operating expenditures ^b	8,364,489	2,717,127	11,081,616	19,252,706	2,970,660	22,223,366	33,304,982

Sources: Virginia Department of Education, *Superintendent's Annual Report, 2004-2005*, Table 15 <http://www.doe.virginia.gov/VDOE/Publications/asrstat/2004-05/asrbook.html> (3/12/07); Auditor of Public Accounts, *Comparative Report of Local Government Revenues and Expenditures, Year Ended June 30, 2005* (Richmond, 2006). http://www.apa.state.va.us/local-government/comparative_cost_archive.htm (6/13/07).

a. Based on rent capitalized at the rates used by local assessors: 9.5 percent for Charlottesville rental property and 7.5 percent, the apartment rate, for Albemarle County.

b. Based on local cost per pupil of \$7,611 in Charlottesville and \$7,073 in Albemarle County.

CHAPTER 3

THE ECONOMIC VALUE OF EDUCATION AND RESEARCH

INTRODUCTION

Public support for higher education dates back to the earliest days in the country's history and reflects the widespread belief that this public investment will create substantial value for society. Thomas Jefferson clearly enunciated his view that a publicly supported "academic community" dedicated to education, service, and inquiry would benefit the Commonwealth by aiding commerce and by educating community leaders capable of enlightened self-government.

The University of Virginia, now an important center of education and research, has leveraged the public funding for its activities to become a major engine of growth for the whole state. The activities of the University now bring into the state external funding several times the size of its annual appropriation of public funds. Support for the educational function of the University enhances the equality of educational opportunities for Virginians and provides a steady supply of high-quality graduates, attracting firms in search of talented and entrepreneurial employees. In addition, the research function of the University has grown far beyond anything foreseeable at its founding.

In the chapter that follows, we will explore how these functions of the modern research university might be expected to contribute to civic and economic well-being. We will draw on what has now become an enormous literature exploring the effects of higher education on students and on their community. We will also examine the contribution that research activities make to the growth of the state's economy. In each case, we will consider what the evidence tells us about the value to the state of public support for a major research university such as U.Va.

A SHORT NOTE ABOUT THE HISTORY OF HIGHER EDUCATION IN AMERICA

Even before they had secured their tenuous foothold in the new world some four hundred years ago, the Jamestown settlers began to plan for an institution of higher education to serve the needs of the colony. In 1618, the founders of the young Jamestown offshoot of Henrico Town obtained a royal charter for founding the "University of Henrico," which would have been the first institution of higher learning in the new world. Cut short by the destruction of Henrico Town in 1622, the founding of a college in the new world had only to wait until 1636, when members of the newly established Massachusetts

Bay Colony founded a college soon to take the name of Harvard, after its first major benefactor.

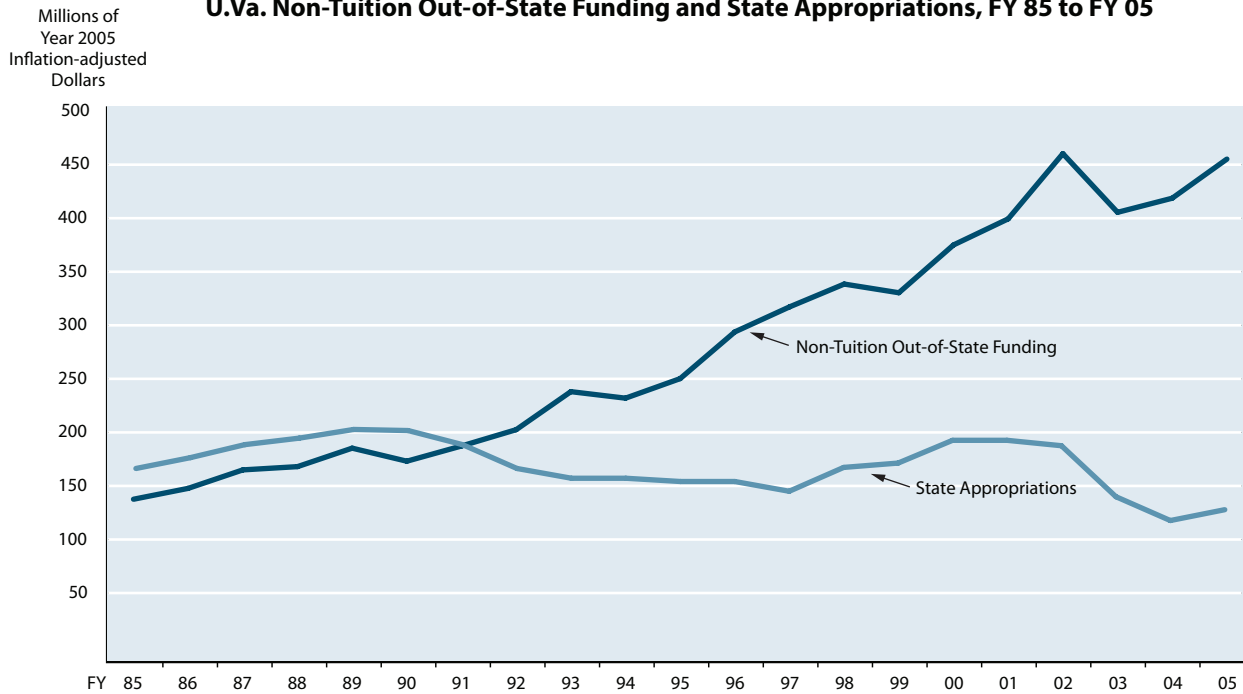
It is remarkable that these efforts to found institutions of higher education and learning came even as the colonists were struggling for their very survival in the new land. The need for training young men for the clergy and for community leadership must have felt very pressing indeed to justify the allocation of very scarce resources to this purpose.

By 1693, Jamestown had received a royal charter for the founding of the College of William and Mary, the first publicly supported college in the new world. Already the role of higher education had expanded beyond the emphasis on moral philosophy to natural philosophy, which included mathematics, physics, and metaphysics. Thus began the tradition, in what was to become the United States, of public funding of higher education.

Until 1800, institutions of higher learning in the colonies were closely affiliated with religious institutions. In that year, Vice President Thomas Jefferson first enunciated his developing vision for a great, publicly supported, secular university dedicated to the spirit of inquiry so central to the Enlightenment. Chartered by the Commonwealth of Virginia in 1819, the University of Virginia embodied Jefferson's vision of an academic community where the search for new knowledge in the liberal arts and sciences became intimately intertwined with the traditional university functions of transmitting knowledge and developing future generations of educated citizens capable of effective self-government. The University of Virginia went on to be the first institution of higher learning in the United States to expand the list of specializations beyond law, medicine, and religion to include such non-traditional fields as botany, astronomy, political science, and architecture.

Two hundred years later, public funding of higher education is an established practice in most countries of the world. Every state in the U.S. has publicly funded institutions of higher learning that encompass the roles of education, research, and service first established in this country at Mr. Jefferson's University. Indeed, every developed nation (and most developing ones) provides public support to research universities. Many of these public institutions are ranked among the greatest universities in the world. In addition, considerable public funds are spent on education and research at privately controlled colleges and universities in the U.S. and elsewhere.

Figure 3.1
U.Va. Non-Tuition Out-of-State Funding and State Appropriations, FY 85 to FY 05



Sources: Graduate School of Arts & Sciences, Office of Institutional Assessment and Studies, Office of Senior Vice President for Development, and Office of Sponsored Programs.

In the face of this strong circumstantial evidence that public support of higher education is of value to people everywhere, it may seem a bit contrary to ask why. Why, when individuals have considerable private motivations to acquire an education beyond high school, is there a strong perceived need to support individuals' access to education with public funds? Why, when both established firms and entrepreneurs have considerable private motivations to engage in scientific research, is there such a universal tendency to spend public money on scientific research at colleges and universities?

These questions are important because every dollar of public funds has an opportunity cost. In other words, the use of one extra dollar for higher education eliminates the opportunity of spending the dollar for another purpose. If we choose to spend one less dollar on higher education, we will have little difficulty finding an alternative use for that money. The very extraction of money from the private economy for public use has a cost, so each dollar of public money costs something more than a dollar to the economy.¹ Consequently, we should only

1. The imposition of a tax changes the perceived value to workers, consumers, and investors of certain choices they might make even though the "pre-tax" value of these things has not changed. As people make changes in their work, purchasing, or investing in response to the

extract that last dollar from the economy if its productivity in a public use is of greater value to society than the loss to private economic activity. In addition, the competition among potential recipients of public funds is intense everywhere. Transportation, public health, law enforcement, public parks, and other public activities have their own benefits. The last dollar spent on higher education should be at least as valuable in that use as in any of the other possible public uses.

THE FLOW OF DOLLARS INTO THE STATE

In FY 05 the state appropriation from the General Fund for operations at the University of Virginia amounted to \$132 million. In that same year, U.Va. brought into the state a total of \$456 million in out-of-state grants, giving, and graduate fellowships. In FY 05, \$1 of state funding for the University supported activities which ultimately resulted in \$3.45 of new spending flowing into Virginia. **Figure 3.1** shows the inflation-adjusted values from FY 85 to FY 05 for state General Fund expenditures on U.Va. alongside out-of-state grant, giving, and fellowship income. Tuition payments by out-of-state students

perceived price changes, then there is a loss of economic value for each dollar removed by taxation. This reduced economic value is often referred to as "dead-weight loss" and may be seen as the "price" paid for extracting tax revenues from the economy.

provided an additional flow of \$166 million into the state, which brings the FY 05 total to \$622 million or \$4.71 for each dollar from the state General Fund. Patients who come to Virginia for treatment at the Medical Center bring additional funds into the state. Also excluded from our total are consulting income and honoraria received by University faculty. Without considering the value that U.Va. creates in fulfilling its educational, research, and service missions, we can conclude that University operations directly generate annual inflows of income of well over \$600 million from sources outside the state.

As many of these dollars are spent on wages, services, goods, and taxes in the state, they create further rounds of gains in economic activity in Virginia. The status of the University of Virginia as a nationally recognized center of excellence in teaching and research leverages the state government expenditures into a considerable inflow of economic value to the state. As the University's reputation has risen, the net flow of funds into the state has increased dramatically.

VALUING OUTPUTS OF THE "KNOWLEDGE FACTORY"

This study will follow the long analytical tradition of treating the modern university as having three distinct but not independent outputs: the transmission of knowledge through education, the creation of new knowledge through research, and service to the larger community. These roles were explicitly included in Jefferson's vision for the University of Virginia.

The universal presence of these outputs in the modern university strongly suggests that there is considerable benefit in their joint production. Unfortunately for the analyst, the joint production of education, research, and public service greatly complicates any effort to measure the University's contribution to the state's economy. The joint outputs will affect the economy in ways that will be hard to separate. In addition, since there will be trade-offs as well as complementarities, it will be impossible to fully disentangle the effects of public support for one from effects on the other. Still, the separate treatment of these functions of the University remains an indispensable analytical convenience. In the remainder of this chapter we concentrate primarily on the education and research components of the University's mission. After treating each of these outputs separately, we will offer some speculation on the advantages of the joint production of education and research.

The core mission of the University of Virginia comprises two intimately related activities: teaching and research. Faculty research makes the University more productive in transmitting new knowledge to students. Talented graduate and undergraduate students help draw productive researchers. Each benefits from the presence of the other. Highly trained graduates generate value in the state economy as workers and leaders. Research generates value in the economy by generating new knowledge that spills over into the local economy as increased productivity and investment.

In evaluating the economic role of a research university, a key question needs to be addressed: What is the economic justification for the role of state government in supporting this type of enterprise? Is there reason to believe that, without state support, the state would have in some sense "too little" of the bundle of services provided by the University? Said another way, is the spending of tax dollars for this purpose the best use of scarce public funds?

To answer these questions, we need to assess the value of the outputs that U.Va. generates for the state. At the same time, we must assess whether private economic incentives are likely to result in a satisfactory level of these outputs, or whether an investment of taxpayer funds may be needed to maximize our net gain from University activities.

THE VALUE OF A UNIVERSITY EDUCATION

Education has long been credited with a wide variety of benefits to both the individual receiving the education and to society at large. These benefits include increased productivity of labor with commensurately higher earnings, increased civic engagement and responsibility, greater cultural awareness, and improved public and private decision making. Recent economic research also points to possible productivity "spillovers" between workers, a sharing of knowledge that increases the overall economic potential of society.

These benefits are usefully categorized for analytical purposes as pecuniary or non-pecuniary benefits and as public or private benefits.

Pecuniary benefits are those that involve money or goods routinely traded in markets and hence with readily determined dollar values. These benefits would include

such items as higher wages, higher economic growth rates, greater tax revenues, lower public expenditures, or more effective savings and investment plans. Non-pecuniary benefits might include such things as greater job satisfaction, greater sense of security, or the enjoyment of the education experience itself. The measurement of the value of non-pecuniary benefits is more difficult because the value is not directly observable. Economists have developed a number of methods for inferring the “willingness-to-pay” for non-pecuniary benefits. These methods include surveys and studies of consumer choices. Because these non-pecuniary values are indirect estimates, they are less accurate than estimates of values for pecuniary benefits.

The distinction between public and private benefits is central to the question concerning the net benefits of public support for higher education. The decision by a student to go to college is based on an expectation that the student will receive a net benefit from college attendance after accounting for the out-of-pocket costs and the costs of lost earnings during college. If there were a net benefit, a student would profit by borrowing against future earnings to fund college attendance. This borrowing may take the form of transfers from parents or bank loans. Even without public support, a prospective student who expects a net benefit from college and who has the ability to borrow against future earnings will probably attend.

This is a key point. For any student whose decision about attending college would not be altered by public support (direct or indirect), the public funding reasonably assignable to that student’s attendance actually represents a net cost to society. The student receives the value of the subsidy, but the subsidy produces no commensurate gain to society, since it does not alter the student’s choice.² Further, since taxation causes an economic cost in terms of distortion of resource allocation, then the transfer of tax funds to this particular student entails a net cost to the economy. This is true regardless of whether there are public benefits in addition to the private ones motivating the student.

This characterization of this student’s choices rests on two key assumptions: first, that the student has sufficient information to enable the formation of reason-

2. We maintain a separation between income transfers intended to redistribute wealth and those intended to induce optimal investment in education.

able expectations about the likely returns to a college education; and second, that capital markets operate sufficiently smoothly that the student can borrow against future earnings at a competitive rate.³ While these two ancillary assumptions seem reasonable when applied to stable households with greater than average income and with well-educated parents, they become less tenable as income and parental education levels fall. Thus, it seems likely that some students who would have a substantial net private gain from attending college may not be able to make the investment due either to inadequate information or to limited ability of disadvantaged young people to borrow against their future earnings. It follows that there will be potential students who will not attend college even though it would be economically advantageous to do so, raising issues of both fairness and net loss to the economy.

There is another class of student to consider. Any program for public support of higher education is likely to result in support for some students who, with full information and efficient access to capital, would choose not to attend college because the costs outweigh the benefits. Even after you account for any possible benefits to society, the return to higher education for some who attend will be below the costs of the education. For students in this category, public funding may induce them to attend college even though there is a negative net value to society of their doing so. Cases such as this can result in a net economic cost to society.

It is not possible for a program of public funding for higher education to discriminate perfectly among these different types of students. There will always be some aid to public higher education going to students whose behavior won’t be changed and to some who will be induced to attend college when the public and private gains do not justify the extra investment. The net cost of this misplaced aid must necessarily be counted against the gain to society that is achieved by the well-targeted aid. These factors should be taken into account both in evaluating the gains from public support for education, but also in establishing the design of the public aid program. One must weigh the expense of more effective aid

3. Technically, they must be able to borrow at the social rate of time preference (SRTP). How closely capital markets come to this ideal is a subject well beyond the scope of this report. There is considerable speculation, though not general agreement, that market interest rates may be above the SRTP and, hence, borrowing less than socially optimal.

targeting against the improved effectiveness of the aid in generating economic value.

EDUCATION: THE PRIVATE VALUE

A college education is associated with substantially higher earnings for those who attend.⁴ Evidence suggests that students and their families value other aspects of higher education as well. College may also be seen by students and their families as a path to maturity, higher status, or expanded horizons, or as an opportunity for social networking. Students may find college life exciting, interesting, or entertaining. For a typical college student, the value of attending will be a combination of these factors.

Increased Wages

College attendance is strongly associated with higher future earnings, and surveys indicate that the desire for increased future earnings is the reason most often given by students and parents for attending college. Wages rise with years of undergraduate and graduate education even for those students who do not complete a degree. The average wage premium associated with a college degree varies substantially over time. From 1950 to 2000, the premium appears to have exceeded 50 percent except for a drop in the 1970s. [Murphy and Welch, 1992; Rizzo, 2005] For reasons that are not yet clear, the degree premium may have increased in recent years. The latest data from the U.S. Bureau of the Census indicate that, on average, those with college degrees earn about twice as much as those without a degree.⁵ (Since only the after-tax portion of wages is “private,” and since tax rates rise with income, the private gain will be somewhat less than that measured by the wage premium.)

Not all of this apparent increase in wages is attributable to the education itself. If, on average, the more able students are the ones who go to college, then it is probably true that those students would earn more than their less able counterparts even if they did not attend college at all. Since students select themselves into the higher education group on the basis of pre-existing skills that would have earned higher wages anyway, the measured returns to education are probably overestimated. But the available evidence supports the conclusion that a college degree adds considerable value to students’ future wages. [Leslie and Brinkman, 1988]

4. It is only after-tax wages that accrue to the student. Any increase in tax revenues is part of the public benefit.

5. For detailed tables from the United States Census Bureau, see <http://www.census.gov/population/www/socdemo/educ-attn.html> (1/9/07)

Some of this increased value may come not from the effect of education on student skills but, rather, from a better matching of the characteristics of the students to the needs of employers. [Blaug, 1985] This is sometimes referred to as the “filtering” function of higher education. Under this view, employers find it costly to judge the likely productivity of new hires. Colleges pre-select students of a given quality range and then sort them out according to skill and interest area by the time degrees are conferred. After this sorting and filtering, firms can make a better match of skills to needs. The tighter fit implies greater expected productivity for the employer, and this translates to higher wages. So the filtering function of universities creates value not by changing the characteristics of the student, but by more efficiently allocating existing skills in the skills market.

It is not possible, given the evidence available, to reject the idea that some significant share of the increased earnings attributable to a college degree arises from better sorting of job market entrants. However, the weight of the evidence currently favors the more traditional view of investments in higher education as primarily investments in increased knowledge, skills, and other attributes that raise the students’ expected productivity. [Becker, 1964; Mincer, 1962; Schultz, 1961].

A student pays for a college education with the expectation that his or her education will result in a net increase in wealth. The funds invested may be borrowed in capital markets, transfers from parents, or earnings of students. The investment is worth making if the return to college is higher than the return to starting work earlier without the college degree. One standard way of measuring the return to an investment in higher education is to calculate the internal rate of return (IRR) of the investment. The IRR is the discount rate that would make the costs of an investment exactly equal to the discounted future returns. If that rate is higher than the market rate of interest, then the payoff to the investment is better than the market rate. If the IRR is less than the interest rate then the investment is not worthwhile in purely financial terms.

Recent studies conclude that the best central estimate for the real average private IRR of a baccalaureate degree is between 10 and 12 percent. [Becker, 1992] A number of qualifications of this figure are in order.

First, this estimate is very sensitive to the cost of obtaining the degree. The costs include any additional out-of-pocket

costs and any lost wages. Given that the costs of attending the University of Virginia are considerably lower than the cost of attending the private universities that would generally be considered its peer institutions, one may expect that the IRR for a degree from U.Va. will be somewhat higher. [SCHEV, 2006]

Second, the IRR estimate does not include any of the non-financial returns to a college education. As we will discuss in the next section, there is evidence that the non-financial returns to earning a college degree are quite substantial. The value of the IRR is quite sensitive to any of the non-financial benefits that occur during college, as these are not subject to significant discounting. Accounting for the non-financial benefits will push the total return well above the rate for purely financial returns.

Third, the financial return to a college degree is sensitive to the field of study because average wages vary widely. The rate of purely private financial return to such disciplines as teaching, the ministry, and social work is much lower than for some other disciplines such as science, mathematics, and business. [Berger, 1992] In some cases, these returns may be negative, meaning that the money invested would earn a higher rate of return invested in stocks and bonds than in a college degree. The decision to invest in a four-year degree in a relatively low-paying discipline is likely based on non-financial characteristics of the investment.

Finally, there is some evidence that, other things equal, students from disadvantaged backgrounds have a higher return to investing in a degree at a more prestigious institution. [Dale and Krueger, 2002] While this evidence is tentative, it does suggest that there is considerable value to programs that provide greater access to U.Va. by talented students from poor and minority households. While these families have a higher than average expected return from a college degree, they also are the most likely to face barriers that prevent optimal investment in higher education.

The returns to graduate education are thought to be lower, with the exception of the professional schools. [Leslie and Brinkman, 1988] Many non-professional graduate degrees would not be profitable investments for individual students if the full costs of the graduate education were paid by the student. There may be non-financial benefits, and there may be benefits that are largely public rather than private.

Benefits Other Than Increased Wage Rates

To most observers, an average IRR of 10 to 12 percent, give or take, is not high enough to explain the consistently large share of middle class and upper income households that choose to invest considerable sums to send multiple children to college for one or more degrees. While the average rate of return appears competitive, for a given family the investment entails considerable risk that the return will be below what might be achieved by skipping college. This is especially true for students likely to enter those disciplines with relatively low rates of financial return. Even students with poor high school grades and moderate SAT scores invest in undergraduate degrees at a participation rate that seems often out of proportion to the net financial returns.

The conclusion that most observers draw based on these observations is that higher education likely has considerable returns that are not adequately captured by measures of increased wages. Haveman and Wolfe (1984) suggest that the returns to higher education coming as higher wages may account for *as little as half* of the value of an investment in higher education. Because these benefits are not directly observable as changes to a person's wage, measuring their magnitude is considerably more difficult. In addition, some of the non-monetary gains have both a public and a private dimension.

Fringe benefits are a form of compensation not directly captured in measures of wage rates but rather are substituted for additional wages as a worker's total compensation level increases. Degree-holders are more likely to have fringe benefits as a portion of their compensation package. Thus, wage rate measures will systematically underestimate the true value of compensation packages. Census data for 2004 demonstrate a strong relationship between education levels and fringe benefits. Health care coverage at work rises from 67 percent to 77 percent to nearly 95 percent, respectively, for high school dropouts, high school graduates, and college graduates. [Carnevale, 2006] A similar pattern can be observed in pension plan coverage. A college degree is also associated with better working conditions, greater options to substitute between work and leisure, and more choice about where to live. These factors lead to greater job security and satisfaction. From this it is reasonable to conclude that the observed wage differential substantially understates the value of a college degree. [Cohn and Geske, 1992]

For many, college life itself is a part of the value of earning a degree. It is a bundle of interesting experiences. College is often a time of intense social engagement in class, at sporting events, in the dorm, in clubs, fraternities, and sororities. There is exposure to new ideas, music, theater, and other forms of entertainment, as well as a broadening of perspective. These experiences leave lasting effects on the consumption patterns of students who often develop strong sentimental feelings toward the years spent in college. For parents, college may provide a promising avenue for the rite of passage into adulthood, a helpful environment for achieving maturity and independence. As evidence for this, one only need calculate the additional cost to full-time students at a four-year college of living on campus over the cost option of commuting to school. Families with higher incomes are more likely to choose the more expensive “college life” package, with all of its perceived benefits, over the much smaller monetary cost of commuting to a campus to take classes. Even for these commuting students, attending class may be a mix of investment in future earnings and in the excitement of expanded horizons.

Studies show that college graduates have more stable marriages and more control over family size and the spacing of children.⁶ [Cohn and Geske, 1992] They tend to spend more time with their children. There is a strong statistical link between a mother’s education level and the cognitive skills of her children. Additional schooling is associated with better family nutrition and with better health for the degree-holder’s entire family. Importantly, while these benefits have great private value to the education consumer, part of these benefits accrue to the public in the form of lower demands on publicly provided social services. This will be discussed in more detail later in this chapter.

Some limited evidence suggests that college attendance may result in more effective saving and investment choices, and educated consumers generally have more information about consumer goods and adopt new products more quickly. [Cohn and Geske, 1992]

There is an additional important class of private, non-monetary benefits arising from investments in education. These are collectively known as “option values.” [Weisbrod, 1962] An important financial option value in the educational setting is in revealing information

6. For a summary of the private non-monetary returns to higher education, see Cohn and Geske, 1992.

about the value of later educational stages. The value of later educational stages, such as professional and graduate school, will have significantly less uncertainty after a student receives an undergraduate degree than before. That is, completing one level of education reduces uncertainty about the value of the next stage. Studies suggest that families may place substantial value on the information-revealing function of higher education. [Cohn and Geske, 1992]

Another way in which higher education reduces future uncertainty is by providing graduates with greater flexibility in responding to new job opportunities and reducing the risk of job obsolescence. [Cohn and Geske, 1992]

We conclude from the evidence that, on average, a college degree can be expected to generate a rate of return competitive with most profitable alternative uses of the money. Some of the returns come in the form of higher money income, while other benefits come in forms that make precise estimates of value more difficult. The willingness of families to continually invest large portions of family wealth in higher education even as the real costs rise provides the most direct measure of this expected value. The gains from higher education, from the increased expected wages to the pure consumption value of college life, provide substantial net benefits to society.

In the case of the purely private returns discussed so far, the benefits accrue to the consumers of the services themselves. Many private individuals have strong incentives to borrow (or defer consumption) as needed in order to make this investment because, for them, the expected rate of return to a college education is higher than the rate of interest. What, then, justifies a public investment in the student loans, student grants, and aid to colleges, policies designed to boost the number of families that choose to pursue a college degree?

In the rest of this study, we will concentrate on three key justifications given for supplementing these already substantial private investments. First, it is widely suggested there are significant public benefits (in addition to the private ones) that may be expected from increasing the proportion of the population receiving college degrees. Second, there may be some structural problem with capital markets, with the availability of information about higher education benefits, or with family decision-making that prevents some people from making economically efficient choices about investing in educa-

tion. In particular, if economically disadvantaged families under-invest in education, then policies aimed at correcting the under-investment will serve both efficiency and equity purposes. A third possible argument concerns the connection between education and research. Socially valuable research at colleges and universities will be addressed in conjunction with the discussion of university research.

EDUCATION: THE PUBLIC VALUE

Probably the most immediately obvious public gain from a private individual's decision to attend college is the increase in tax revenues that would arise from any increase in the individual's lifetime earnings. In fact, if government aid to higher education only went to students with high expected wage gains who would not have otherwise gone to college, the government could conceivably run a profit from funding college degrees. Primarily because aid is not targeted according to likely wage gains nor is it limited to those students who would not have otherwise gone to college, the prospect that government could actually profit from student financial aid is remote. Also, some fraction of aid recipients will take their increased productivity to another state or country where they will pay their increased taxes. However, the wage gains received by students who would not have earned them except for the government aid are probably significant. Measuring the size of these revenue gains is very difficult because we do not know who would have earned what in the absence of the aid.

Social Gains

If an increase in wages implied that a person made proportionately larger demands on the services of government, then there would actually be a net loss to funding participation in higher education. But there is considerable evidence that additional education is associated with reduced demands on some government services and with a number of positive social outcomes. [Rizzo, 2005] For example, we know that crime rates fall as education levels increase. In addition, more education is associated with a greater ability to prevent crime. This puts a lower demand on criminal justice services budgets and also provides the direct benefit of lower crime rates to other members of the community. [Rizzo, 2005; Watts, 2001; Krop, Carroll, Vernez, and Rydell, 2000]

Higher education levels are associated with lower demands for welfare, disability insurance, and Medicaid. Those with higher levels of education tend to give more of their time and money to charities and com-

munity service. One recent informal analysis found that 45.6 percent of college graduates participate in volunteer activities, compared to 21.7 percent of high school graduates. [Rizzo, 2005] College graduates donate more blood than high school graduates, 17 percent to 11 percent. Voter participation increases substantially with education levels. [Dee, 2003] As a corollary to this, community leaders are drawn disproportionately from the ranks of those with a college education. A study published by the RAND Corporation in 2000 estimated the *public lifetime* gains of a college degree compared to a high school diploma to be \$170,000 (in 1997 dollars) after subtracting the costs of public support for the college degree. [Krop, Carroll, Vernez, and Rydell, 2000]

These figures probably overstate the gains to a college degree itself. Some of the gain certainly comes from putting young people in a position to benefit from a college degree through investment in early childhood development and K-12 education. However, the magnitude of the net benefit is suggestive of the benefit that may be achieved by investment in an education system that offers a wider proportion of the population a reasonable prospect of obtaining the benefits of a college degree.

It is disappointing not to be able to offer a quantitative measure of these public benefits. However, for a variety of reasons, these effects are devilishly difficult to measure. The people who end up going to college may be different from those who do not. How much of the difference is due to the college experience itself is extremely hard to measure. But hard to measure does not mean insubstantial or small. As the actions of the early settlers of the new world amply testify, there was a strong sense, even in the earliest days of the country, and in Virginia in particular, that the investment in higher education was important for the survival and prosperity of the community and, hence, was worthy of public support.

Economic Gains

One of the principal justifications for public support for higher education is based on the proposition that an educated workforce contributes to the state's economic growth rate above and beyond the increase in productivity of the individual worker. The increase in the individual's productivity is rewarded in the marketplace with higher compensation. Thus, unless there is something beyond the direct gain in productivity, we would generally expect private labor markets to induce the correct

investment in college degrees.⁷ To justify public investment in education to boost economic growth rates, there needs to be more.

A number of studies have found suggestive correlations between state spending on higher education and future rates of economic growth. [Helms 1985; Wasylenko and McGuire, 1985; Jones and Vedlitz, 1988] However, these studies did not identify the mechanism giving rise to this correlation or identify whether it is through the quality of the labor force or through the support of university research. Other studies have explored the connection between the education of the local workforce and rates of economic growth. In particular, there appears to be a growing body of evidence that, *for urban areas* in particular, the education level of the population helps boost future growth rates in the area.⁸ [Glaeser, Scheinkman, and Shleifer, 1995; Glaeser and Saiz, 2003; Moretti, 2004; and Varga, 2000] These studies suggest that the mechanism for this increased rate of growth has to do with interactions among workers and firms. These interactions result in a boost to productivity that is greater than the sum of its parts. That is, the knowledge sharing in the urban economy can result in one person's expertise raising the productivity of other workers.⁹

Recent theories of economic growth posit a similar mechanism to explain the role that knowledge plays in national and global economic growth rates. Increased knowledge “spills over” from the firm or industry where the initial investment in knowledge is made to other firms and industries. This spillover is value that is generated but that does not result in a gain to the original investor. Under such circumstances, without public support for higher education, the rate of growth will be inefficiently low.

Empirical evidence suggests that cities with a more educated population have experienced higher rates of economic growth than cities with less human capital. The cities with a higher stock of human capital grow faster because they have higher worker productivity, which is partly because workers in these cities adapt better to economic shocks; they are more flexible. [Glaeser,

Scheinkman, and Shleifer, 1995; Glaeser and Saiz, 2003; Moretti, 2004; and Varga, 2000]

So if the support of higher education results in an increase in the ready availability of high-quality labor, especially in urban areas, then such a policy may be expected to add to economic growth rates in the future. Unfortunately, the evidence for the retention of high quality labor trained in local universities is mixed. The relationship between the local production of college-educated workers and the number of college-educated workers in the workforce depends, among other things, on the type of degree, the mobility of graduates, and the local demand for the degrees. [Bound, Groen, Kezdi, and Turner, 2004; Groen and White, 2004; Hoxby, 1997] For example, evidence suggests that physicians are quite unlikely to remain in the state in which they were trained. This is due to the relatively inelastic demand for physicians. Certainly, it seems evident that students trained at a top-ranked school such as the University of Virginia are of sufficient quality to compete at the national and international levels for employment. Some have even suggested a policy directed more at importing high quality labor trained elsewhere rather than training the labor locally in the hope that graduates will stay in the state. [Rizzo, 2005]

The available labor market evidence seems to suggest that, in the short run, the propensity of college degree-earners to remain in the state is mostly determined by the local demand for the labor created. In the longer run, the availability of substantial numbers of locally trained degree-holders contributes to the likelihood of employers locating their facilities in Virginia, thereby expanding local demand for locally educated degree holders. A 1986 study by the Conference Board provides evidence that “access to needed scientific and technical personnel” is probably the single most important factor in the location of corporate research and development facilities.

U.Va. graduates are part of the supply of highly educated labor available to employers in the state. Their presence makes it easier for employers to fill positions with employees whose high level of skill and adaptability will enhance prospects for sustained higher rates of economic growth in Virginia. A consistently low rate of unemployment in Virginia, along with a relatively high demand for labor with advanced training, makes it likely that a substantial proportion of U.Va. graduates will be available for positions of employment in Virginia. Excluding the District of Columbia, in 2003 (the

7. This is, of course, abstracting from any major inefficiencies in the capital and information markets.

8. For some evidence counter to this view, see Topel, 2004.

9. There is some controversy as to the size of any local boost to productivity from spillovers from educated workers. For example, see Topel, 2004.

latest available figures), Virginia was number one in the country in science and engineering workers as a share of the workforce and number one in the country in computer specialists as a share of the state workforce. [NSB, 2006]

Providing affordable and exceptional higher educational opportunities also contributes to the state's quality of life, a measure that also has considerable importance in R&D facility location decisions, according to the Conference Board study. The study also reports that being near a university or research center is an important factor. These results raise the prospect that there is some public gain to providing high quality college education even to students who eventually migrate to another state. First, the presence of such colleges enhances the public image of the state as an attractive place to live, making it easier to recruit educated workers and their families. Second, many graduates will make remittances to the state either in alumni contributions or directed corporate giving. Third, the presence of graduates of Virginia universities in positions of leadership in the arts, corporations, and government provides a subtle but effective form of positive publicity for the state.

There is another way that the presence of a prestigious university such as U.Va. contributes to future economic growth. The presence of top-notch universities in a state makes a major contribution to the state's business climate. For example, the business website Forbes.com specifically cited higher education as one of the important factors in giving Virginia its "Best State for Business" award in 2006:

One of Virginia's strongest attributes is its two highly ranked institutions of higher education. The University of Virginia and the College of William and Mary graduate up to 5,000 graduates a year, many of whom stay in-state. They help contribute to Virginia's college attainment rate of 34% which is the seventh highest in the country. Life sciences businesses have popped up in and around Charlottesville because of U.Va.'s highly rated medical school.¹⁰

High rankings for business climate are enormously important advertisements for the state.

10. http://www.forbes.com/2006/08/15/virginia-business-climate_cz_kb_0815virginia.html (12/2/06)

EQUALIZING ECONOMIC OPPORTUNITY

Thomas Jefferson's original vision of the University of Virginia was grounded in the view that this academic community should be a meritocracy that would gather the best intellects from all strata of society. These best and brightest would form a foundation upon which enlightened self-government could thrive. Two key themes are combined in this vision; first, that a person's status in society should not be predetermined solely by birth circumstance, since opportunities for advancement should be available to all; and second, it is in society's best interest to find the most talented people and to make the most of their abilities whatever their social origin. Although the application of these ideas has broadened beyond anything expressed by Jefferson himself, these two themes still resonate today as key objectives behind public support of higher education.

In our discussion of the private returns to college, we presented evidence that the private return is large enough to justify considerable investment in higher education. However, there is a large and persistent gap in the proportion of students from different income groups who attend any post-secondary institutions. Only 28 percent of high school graduates from families in the lowest income quartile attend a four-year college, as opposed to 66 percent of students from top quartile families. [Ellwood and Kane, 2000]

Part of this gap may be attributed to the many disadvantages of growing up in a lower income household, which result in less effective preparation for college. However, even after controlling for student abilities, students from households with lower socioeconomic status are significantly less likely to continue education past high school. In fact, as McPherson and Schapiro note, "[d]espite decades of policy discussions and massive government expenditures, a top-performing low-income high school student is no more likely to attend college than a low-performing student from an affluent family." [McPherson and Schapiro, 2004, p.5] Using a socioeconomic status (SES) index for high school graduates based on parental income, education, occupation, etc., Baum estimates that 77.3 percent of graduates in the top SES quartile with achievement test scores in the lowest quartile enroll in college. [Baum, 2004] Of students in the lowest SES quartile who score in the highest achievement test quartile, 77.6 percent enroll in college. Ninety-seven percent of high SES, high achievers enroll.

These statistics present a strong case for a breakdown in the meritocratic function of financial aid for higher education. The failure to provide equal opportunity for students of equal academic merit is not just unfair, it is economically wasteful. Given the high probability that high achieving, low SES students would earn a very respectable private and social return on their investment in higher education, the lost returns from not making this investment reduce social welfare accordingly.

This income gap in college enrollment is not just an issue of financial aid and college access. We know that early childhood development, a stable and nurturing home life, a quality K-12 education, and many other factors contribute to the continued gap. [Heckman, 2005] However, we also know that financial aid and other policies designed to increase access to higher education for those from disadvantaged backgrounds can have a significant impact. There is reasonably strong evidence that, other things equal, students and their families increase their investment in higher education as tuition rates fall. There is also evidence that student financial aid (that is, subsidies that reduce the actual costs of attending college) also increases attendance. [Leslie and Brinkman, 1988] However, this picture is confused by the lack of clear evidence that federal Pell grants to low-income families have produced a similar response. [Kane, 2001] Also, the response of families to the changing market returns to a college education appears to be significantly less than their response to a change in tuition costs of equivalent value. But Bound and Turner (2006) find convincing evidence of a substantial responsiveness of degree production to the level of public resources available to students. They found that larger cohorts of students received lower public subsidies per student and that these lower per student subsidies were associated with lower rates of degree production from large student cohorts.

The implication is that there are other factors that cause low SES households to be less responsive to aid than are middle-income households. And different aid programs produce different responses across SES groups. More research is required to better understand why households respond differently to the different programs. The complexity of the financial decision and of the financial aid institutions may result in sub-optimal family investment decisions. Different aid programs also present very different perceived financial risk for families. For example, a lower advertised sticker price for a college presents a very different risk profile to a family unsure of

their individual return to investments in education than would an increase in Pell grant awards and loan terms, which are only known late in the admissions process. [Kane, 2001]

The demonstrated responsiveness of students to tuition costs does not imply that lowering tuition costs through a general subsidy to colleges and universities is the best policy response. Each policy option requires trade-offs of effectiveness, fairness, and cost. A tuition subsidy policy reduces costs to all who attend, including those who would have attended without the subsidy. The larger this incidental subsidy, the less productive is each dollar spent in accomplishing the intended goal.¹¹ Tax credits and tax deductions for education costs share the attribute that much of the aid goes to families whose decisions about college attendance would be much the same in the absence of the tax policies. An additional state dollar spent on education aid has a high opportunity cost for the state since that dollar could be spent on Medicare or on transportation infrastructure where federal matching rates may be as much as 50 percent or better. [Kane and Orszag, 2004]

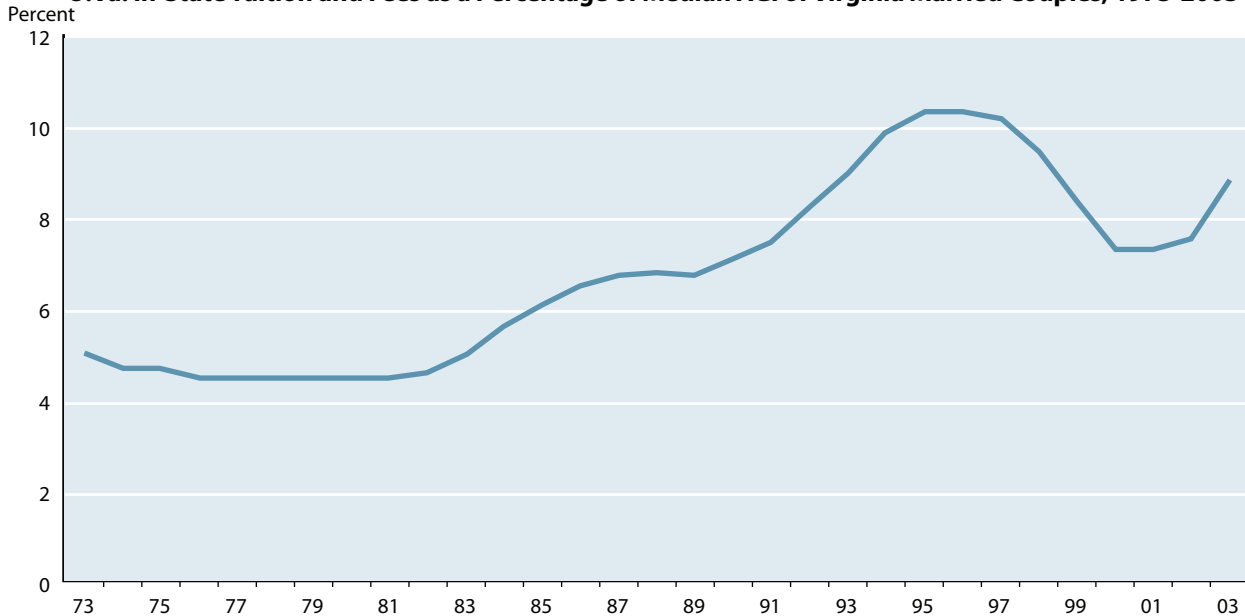
A more targeted aid policy, such as means-tested education vouchers like Pell grants, will result in fewer incidental subsidies to those who would otherwise attend anyway, although this improvement comes at the expense of higher administrative costs. Means-tested aid also has the unintended consequence of reducing the real returns to savings and investment. This is because an increase in a family's savings results in steep reductions in aid eligibility for the student. Since increased savings are offset by larger college tuition bills, the real return to saving for a low-income family is lower than the nominal earnings.

There is yet another possible cost to any given aid program for higher education. Not all students have positive net expected gains from investing in a college degree. For students who are either unprepared or unqualified to succeed at college, aid may result in an overinvestment in higher education. Starting college studies when considerable remedial coursework is needed and when persistence is unlikely could be a very poor investment

11. There is considerable comment in the literature on aid to higher education about the value of broad subsidies to college attendance in increasing political support for higher education, since anyone choosing to attend college would pay lower costs and hence receive a greater flow of net earnings from attending. This does not change the economic costs and benefits associated with such a program.

Figure 3.2

U.Va. In-State Tuition and Fees as a Percentage of Median AGI of Virginia Married Couples, 1973-2003



Source: Weldon Cooper Center for Public Service and Office of Institutional Assessment and Analysis.
Note: Calendar year estimates of tuition and fees were derived by averaging academic year data.

compared to the alternatives. According to Rosenbaum (2003), “for seniors with poor high school grades who planned [two- or four-year] college degrees, less than 14 percent completed a degree.” Rosenbaum reports that many low scoring high school graduates start college taking one or more remedial classes, and this lowers their probability of finishing. “[A]bout 31 percent of college entrants earn no college credits at all, and more than 52 percent of students with high school grades of C or lower earn no college credits. Such ‘college-bound’ students are really work-bound, and they do not benefit from the college-for-all approach.”

That said, students unprepared for college are unlikely to enroll in U.Va., given the University’s status as a highly selective “public ivy.” Once enrolled, students at U.Va. have a high one-year retention rate of 97 percent along with high four- and six-year graduation rates of 83 percent and 92 percent respectively. The University’s 86.5 percent graduation rate for African American students has been the best among major public institutions in America for thirteen consecutive years.

Throughout the 1970s, undergraduate in-state tuition and fees at U.Va. hovered just under 5 percent of the adjusted gross income (AGI) of married couples in Virginia. In the early 1980s, as the level of state sup-

port for the academic division slowly declined from 33 percent to under 14 percent, tuition began to rise and finally leveled off at around 10 percent of married couple AGI in the mid-1990s with a temporary dip early in the current decade due to a freeze in tuition increases (Figure 3.2). The doubling of the relative burden imposed by tuition and fees over this period could be expected to impose substantial burdens on lower income families as the coverage of federal and state student aid shrank. In addition, Pell grant coverage of tuition bills fell from about 80 percent in the 1970s to the current coverage of about one-third. The combination of these circumstances could be expected to cause a substantial reduction in the perceived affordability of U.Va. among those with middle and lower incomes.

In order to counter the effect of rising costs and lower aid levels on the enrollment of high achieving students from lower income families, the University has implemented an institutional aid program to meet 100 percent of the demonstrated need for all admitted undergraduates. The program is called AccessUVa. Components of AccessUVa are (1) financial aid packages that provide 100 percent of need to all undergraduates, (2) elimination of loans for low income students or those whose family income is equivalent to 200 percent of the federal poverty level or less, (3) a cap on need-based loans for all

students at 25 percent of the anticipated four-year cost of attendance, and (4) a financial literacy and debt management program for students and families. Converting loan-based aid to grants for the families with the lowest income reduces the “sticker price” of attending U.Va. to essentially zero for these families. By limiting the use of borrowing to replace declining federal and state grants, the program avoids exposing lower income households to substantial financial risk, a factor that appears to have limited participation by lower income households in programs that would leave students in debt far beyond the family’s reasonable financial frame of reference. Available evidence suggests that AccessUVa can be expected to increase applications, and ultimately enrollments, by high academic achievers from lower income households.

A study by Dale and Krueger (2002) suggests that, for students with similar achievement measures, students from lower socio-economic status backgrounds receive a larger net benefit from attending prestigious academic programs than do their peers from advantageous backgrounds. The reason for the increased gain to students from disadvantaged family backgrounds in attending a top-ranked program rather than a lower-ranked program is not clear. It may be due to increased educational gains from attending the more prestigious program, or it may be that a credential from a more prestigious school more effectively eliminates any social stigma that may follow a talented but disadvantaged student even after receiving a college degree.

The mechanism for the boost in future earnings is not fully understood, but the economic consequence is clear. Any higher earnings that result from programs boosting attendance at top-ranked schools of high-achieving students from disadvantaged backgrounds represent an economic gain that is, at the same time, consistent with the meritocratic roots of public education.

Recent agreements between Virginia’s four-year public colleges and community colleges provide guaranteed admissions to any community college student completing the required coursework with grades meeting standards specified in the contract. These agreements are the result of provisions of the higher education restructuring law passed by the 2005 General Assembly. In return for greater managerial autonomy, the law requires Virginia colleges to provide greater access to community college graduates.

For a student attending community college for two years and then transferring to U.Va., the immediate financial benefits are substantial. At in-state rates, tuition and fee savings alone amount to around \$5,500 per year.¹² Since students at community colleges are more likely to live at home, the actual out-of-pocket cost differential will likely be greater. This cost differential does not apply to students from the lowest-income families because these students qualify for 100 percent grant aid under AccessUVa. Families with somewhat higher incomes will still qualify for considerable grant support in addition to some loans. Thus, the greatest cost savings will fall more to those in the middle range of incomes. These are families who may have chosen to forgo a U.Va. education due to the cost. Among these students, some would have been offered admission on the basis of their academic credentials; others would not have.

The guaranteed access to community college graduates may limit the number of transfers accepted from other four-year colleges. If the University expects a significant number of guaranteed admission transfers, then any open spots that might go to academic transfers from other four-year schools may have to be held open for likely community college transfers.

Too little is known about the likely outcome from this policy to allow a conclusion about its likely economic consequences. We do not know how the guaranteed transfer students will perform at U.Va., nor how the split path might affect future gains from college attendance. There is some probability that a significant number of students with lower standardized test scores and lower high school grades could enroll as third-year students. It is not known how college rating services might respond.¹³ Indeed, since high school grades will no longer be as important in determining whether a student can earn a degree from U.Va., one might expect to observe some reduced effort among college-bound high school students since there is now a backup path to enrollment in the case of lower grades and test scores.¹⁴

12. This calculation is based on comparing the approximate annual tuition cost of a two-year degree from J. Sargeant Reynolds Community College with the annual tuition and fees at U.Va.

13. There has already been commentary on this point on *The Princeton Review* web site. See: http://www.princetonreview.com/college/apply/eyeonapply/2006/brandon_jan.asp (2/20/07)

14. Cf. Rosenbaum (2004).

THE VALUE OF UNIVERSITY RESEARCH

The modern research university is a knowledge factory. Increased knowledge is arguably the most important contributor to improvements in our standard of living over time. But new knowledge can be put to use anywhere in the world. To what extent do the benefits of Virginia's investment in a major research university such as the University of Virginia stay here rather than migrate elsewhere? If knowledge is highly mobile, then why not let others pay the costs of developing new information while we collect a share of the benefits for free?

While policy makers have long acted on an intuition that there is a local value to local knowledge creation, it is only within the last two decades or so that researchers have been able to measure the contribution of locally created knowledge to the local economy. Even now, the results of these investigations are more suggestive than they are definitive, and we still do not understand fully the mechanism through which a local gain is created by a local contribution to the global store of knowledge. This last point is important because even if we believe there is a gain from supporting the university research function, if we do not know how this translates to local wealth, then it is difficult to fashion a public policy that will reliably generate gains large enough to justify the expenditures.

The research output of the modern university is produced jointly with its other key output, the transmission of knowledge, which we have already discussed at length in the previous section. As we will discuss later, there are probably very significant advantages to producing these two outputs together. This complicates any decision on research policies, since the effect on the education outputs of the university must be taken into account as well. The good news is that it is cheaper to buy knowledge production and education together than it is to buy them separately.

If knowledge is so easily transferred across state and national boundaries, then what are the advantages of paying to have the knowledge produced locally? We have already discussed the evidence that the presence of a more highly educated workforce can provide a long-term boost to growth rates, especially in urban areas. The research function supports the enhancement of human capital because top-ranked departments are needed to recruit and train top-tier graduate students. Top departments are defined by their creativity and productivity in generating new knowledge and new techniques of

measurement and analysis. Thus, the research function is essential for increasing the number of high performing graduate students in the state. While many of these students will eventually move elsewhere, they form a pool of ready recruits available to the Virginia job market.

Most obviously, state support for the research function results in a flow of sponsored research funding, most of which comes from outside the state. In FY 05 U.Va. faculty received almost \$300 million in research funding from outside of Virginia, including \$237 million from the federal government.¹⁵ This amount alone is more than twice the total \$140 million state appropriation to the University. On average, each full-time faculty position at U.Va. now generates in excess of \$100,000 in sponsored research funding, most of which derives from out-of-state sources.¹⁶

UNIVERSITY RESEARCH AND ECONOMIC GROWTH

Empirical evidence strongly supports the conclusion that, especially in the science and technology fields, the creation of new knowledge itself is associated with geographically localized concentrations of industrial innovation. Also, industrial innovation is associated with locally increased economic growth. Studies suggest that two possible mechanisms drive this local impact of knowledge generation: (1) local knowledge spillovers and (2) entrepreneurial activities of star scientists. Some of the key evidence for this comes from the geographic concentration of patent citations close to the area where the patent was generated, providing a concentration of new firms near university research. Other evidence derives from survey data on industry innovation.

As already noted, there is evidence that when one firm or agency generates knowledge, there are benefits to nearby firms. Knowledge is easily transmitted through person-to-person contact. In this way, the creation of new knowledge at universities can give rise to a concentration of firms in closely related industries that can all take advantage of the increased flow of productivity-enhancing information flowing through the local economy. These spillovers occur within industries but also between industries. It is the spillover of knowledge between industries in a local area that is often given as the explanation for the increased growth of urban areas

15. This figure is derived by subtracting state-source funding from the \$312 million in sponsored research funding for FY 05.

16. http://www.web.virginia.edu/iaas/data_catalog/institutional/data_digest/emp_fac_gender.htm (2/20/07)

with higher concentrations of human capital. [Varga, 2000]

One of the key triggers for this local information effect is the entrepreneurial activity of local faculty and graduate students. There is strong evidence that firms preferentially seek out contractual relationships with leading faculty even if these faculty are at some distance from the firm's other activities. This is especially true with basic research but also, to a lesser extent, with applied research more directly applicable to existing development and production activities. These contractual relationships may take the form of consulting contracts or the star researcher directly participating in the start-up of new firms. Top faculty are relatively less mobile than are the firm resources needed to tap that expertise. Hence, the research activities of firms tend to seek out the top researchers by locating activities close to the researchers. For those faculty who wish to participate directly in the formation of new firms, proximity is very valuable. Evidence from the biotechnology industry shows a strong correlation between the location of star faculty in related academic departments and the rate of formation of new biotech firms. [Zucker et al., 1996] In addition to increased investment in the area, the faculty consulting income contributes to local economic activity.

Mansfield (1995) has demonstrated the reliance of industrial innovation on university faculty research. This helps explain a result noted by Jaffe (1989) and others that for highly innovative industrial sectors, "... university research appears to have an indirect effect on local innovation by inducing industrial R&D spending." [Jaffe, 1989, p.957] In addition, firms are willing to rely on somewhat lower-ranked departments for research that is more applied in nature. So even if a department is not in the top rank of its field, it may have considerable value to firms that have development and production activities in the area.

These results are subject to some important qualifications. They do not apply to all areas and all disciplines equally. The value of contractual relationships with star faculty will depend on the "excludability" of the new knowledge, i.e., the ease with which researchers can restrict others from learning and applying the new knowledge. The more excludable is the knowledge, the more likely are localized benefits. Otherwise, most local

gains would likely occur through knowledge spillovers. Some evidence suggests that these spillovers are more effective near urban areas than in rural ones. Finally, Jaffe (1989) finds the local effects of academic research particularly pronounced in the areas of drugs and medical technology, along with electronics, optics, and nuclear technology. He concludes that "... a state that improves its university research system will increase local innovation both by attracting industrial R&D and augmenting its productivity... [T]he effects we are discussing appear to be large." [Jaffe, 1989, p.968] He goes on to note that there is an "... apparent disadvantage of dispersed public university systems in attracting research money" as opposed to a strategy of geographically concentrating top researchers.

There may be considerable value in state policies specifically directed toward developing concentrations of top faculty researchers and toward facilitating local entrepreneurial activity by those researchers and their students. Research parks are an interesting case in point. Research parks were once a rarity, and there are some very well-known success stories among the early parks. Now, however, research parks are quite common and the relative likelihood of a new park being a runaway regional growth engine is quite low. Universities do not have a particular comparative advantage in the field of real estate development.

Universities *do* have a comparative advantage in knowledge creation. Therefore, it seems likely that the key function of the university research park, including those at U.Va., is as a vehicle for encouraging local contracting with university faculty and graduate students, and local concentrations of firms that can gain particular advantage from locally generated knowledge and expertise. [Geiger, 2004]

It is also a reasonable conclusion to draw from the literature that patenting activities at research universities should generally be viewed not primarily as a moneymaking commercial enterprise, but rather as a supplement to the contracting and spillover mechanisms for boosting local development. As with real estate, universities do not have a particular advantage in commercializing technologies whose origins are in the labs of university researchers. Patent revenues at research universities are very highly concentrated and are not closely related to the quality and quantity of research activities at those institutions. A large

share of patent income is earned on a few “blockbuster” patents. Patent activity at universities has grown since the passage of the Bayh-Dole Act in 1980, but the relative importance and generality¹⁷ of the patents have fallen, as many lower-performing patents have been pursued [Henderson, Jaffe, and Trajtenberg, 1998].

In 1990 Feller predicted that the Bayh-Dole Act would not result in big patent bonanzas at universities:

There is little reason to expect, based on past performance, that any sizeable reallocation of faculty efforts towards commercially oriented R&D will generate appreciable new net revenues for other than a select number of universities. Seeking to garner sizeable net revenues streams from increased patent and technology licensing is for most institutions the equivalent of purchasing lottery tickets whose expected value is likely to be less than the purchase price. [Feller, 1990, p.346]

Eight years later, Henderson, Jaffe, and Trajtenberg (1998) confirmed Feller’s prediction. They found that the change in patent activity probably did not reflect an increase in the “underlying rate of *generation* of commercially important inventions at universities.” Either universities had not shifted their research efforts towards greater immediate commercial applicability of research, or if they did, they did so unsuccessfully. Rather the change signaled a greater rate of technology transfer to the private sector, which probably increased the social rate of return to the research.

[I]f commercial inventions are inherently only a secondary product of university research, then it makes sense for policy to seek to ensure that those inventions that do appear are transferred to the private sector... [Henderson, Jaffe, and Trajtenberg, 1998, p.126]

The implications of this research are that research parks and patenting offices should not be judged solely by the income that they return to the university. They should be viewed more as tools in achieving the university’s key goal of maximizing its value in the creation and transmission of knowledge, with an important secondary goal being to help retain a reasonable share of that value in the state. Much of their benefit will be more subtle: the

17. By “generality” we mean the range of use of the patent across a variety of applications. For example, the transistor and the laser would be considered to be inventions with a high degree of generality.

recruitment and retention of top faculty and students, and an increase in local entrepreneurial activity and local development spillovers from the activities of highly talented researchers and their graduate students.

In general, university efforts to become more directly involved in the development of commercial technology do not play to its natural advantages and may even end up redirecting university resources toward activities that have lower long-term rewards for the region and the state. The evidence suggests that focusing on the core academic role of creating new knowledge and transmitting knowledge through undergraduate and graduate teaching is the key to maximizing the economic value of the modern research university.

The increasing body of evidence on the effectiveness of highly ranked university research programs in science and technology has prompted numerous states to push to upgrade the quality of university research within their states. This has increased the demand for top researchers who form the core of such departments, which has, in turn, increased the cost of attracting top researchers. Increasingly, universities must offer larger salaries along with better laboratory and clinical facilities to attract top candidates. Employment for spouses, quality education for faculty children, and enhanced support of entrepreneurial activity are also important. In some cases, offers must be made to hire a core group of researchers together in order to attract the star researcher who anchors the group. And universities face the constant prospect of having their best faculty become the recruitment target for other development-hungry states.

U.VA. RESEARCH INITIATIVES

The structure and focus of the University of Virginia’s development initiatives appear broadly consistent with the approach suggested by research in this area. First, the recruitment and retention of top faculty and students is clearly the central organizing theme of U.Va.’s long-range plan. In addition, the University is pursuing a set of secondary initiatives designed to support, rather than compete with, the core academic mission. The development of research parks, assistance with patenting of faculty inventions, and a package of activities supporting entrepreneurial activities of faculty and students all serve to further the goal of academic excellence while encouraging the local siting of the spin-off activity.

While competition in attracting new top faculty has clearly increased in recent years, U.Va. already has been

successful at recruiting a number of researchers in the science and technology disciplines who are in the top rank in their fields. For example, in biomedical research specialties alone, U.Va. has recently added several nationally recognized leaders: Dr. Bankole Johnson (2004) in psychiatric medicine, Dr. Michael Dake (2006) in radiology, Dr. Cato Laurencin (2004) in orthopedic surgery and biomedical engineering, and Dr. Jerry Nadler (1999) in endocrinology. In addition, the Board of Visitors has committed \$126 million towards enhancing science and technology research at the University by hiring ten new world-class researchers and providing space and infrastructure in support of their work. The initiative has to date resulted in the hiring of five internationally recognized scholars: one each in engineering, chemistry, and genetic epidemiology, and two in cell biology.¹⁸

The presence of these scholars may be expected to have both direct and indirect benefits for the state economy. They will increase the amount of research funding coming into the state. They will enhance the reputation of the University in the science and technology areas. And, given their status in their respective professions, their presence may lead to local benefits through either spillovers or local entrepreneurial activity.

Research parks at U.Va. are developed and managed by the U.Va. Foundation with the primary aim of supporting the academic mission of the University, not as an independent money-making enterprise or a regional development initiative. Studies on the effectiveness of research parks support this academic-oriented focus. [Geiger, 2004] The parks are managed to ensure that firms with natural connections to the University are not prevented from forming those connections by the difficulties in arranging suitable space. Tenants include University offices, firms wishing proximity to faculty expertise, and faculty spin-off firms. For example, the Fontaine Research Park provides clinical and research space to the University's endocrinology department, which is one of the top five in the country. Fontaine also houses the CFA Institute, a HealthSouth rehabilitation hospital, and assorted University offices.

The University of Virginia Research Park, to the north along U.S. Route 29, provides space for faculty start-ups such as Pinnacle Pharmaceuticals, Adenosine Therapeutics, and PRA International, among others. Research offices using or planning to use the park include

18. http://www.virginia.edu/vprgs/faculty_recruitment.html (12/5/06)

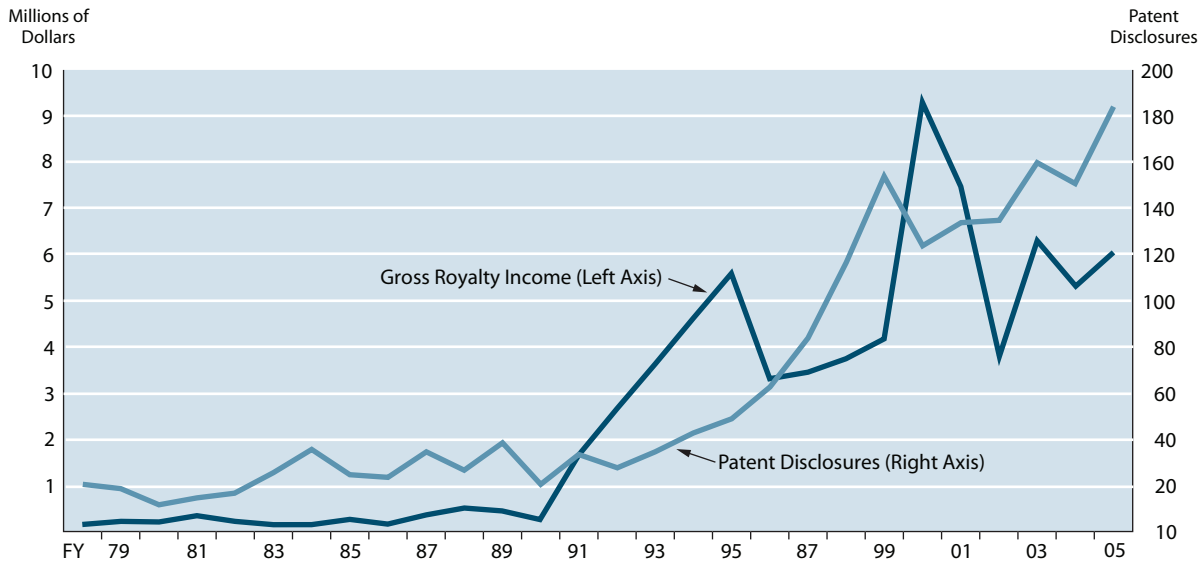
Battelle Memorial Institute, Carlisle Industries, Athena Innovative Solutions, Inc., Northrup Grumman, and Biotage, all of which need ready access to U.Va. faculty for their scientific and engineering expertise. Based on discussions with tenants, the U.Va. Foundation has concluded that 75 percent of the tenants chose to locate in the Charlottesville area due to the availability of space in one of the research parks.

Not all of those desiring proximity to the University choose to locate in research parks. The list of firms and agencies with a clear connection to U.Va. includes the U.S. Army's Judge Advocate General's Legal Center and School, the National Radio Astronomy Observatory, the Virginia Transportation Research Council, the National Ground Intelligence Center, Virginia Diodes (a faculty spin-off), ContraVac (another faculty spin-off), and the Federal Executive Institute. Many other firms, although with less direct connections to faculty, have probably located in Virginia due in substantial part to the presence of the University as a center of research, learning, and expertise. We cannot identify these firms with confidence but can observe their effect in raising the rate of growth of employment and personal income in the region far above that of many other regions in the state.

The Patent Foundation at U.Va. earns income for the University from patents on faculty research. **Figure 3.3** on the next page shows the number of patent disclosures and gross royalty income for 1979 through 2005. In FY 05 gross royalty income from patents totaled more than \$6 million, of which more than \$3.1 million was provided to U.Va. and the faculty as incentive compensation. As discussed earlier, the transfer of faculty inventions to the market has economic development benefits aside from its role in helping retain the talents of entrepreneurial faculty. The foundation, through its Spinner Technologies subsidiary, offers business consulting services to faculty entrepreneurs in return for a share of ownership in resulting firms.

In response to the concern that local University-related entrepreneurial activity has been hampered by the limited availability of venture capital for new firms, the Patent Foundation has created a venture capital unit, the Jefferson Corner Group. Described by the patent office as an "angel investment fund," the Jefferson Corner Group will work to match investors with start-up entrepreneurial efforts of University researchers. Insofar as the new fund can lower the cost of matching available local investment funds with entrepreneurial researchers,

Figure 3.3
U.Va. Patent Disclosures and Gross Royalty Income, FY 78 to FY 05



Source: University of Virginia Patent Foundation.

it can be expected to provide some gain in local economic activity arising from University research.

As one further assistance to research entrepreneurs at the University, the Office of the Vice President for Research and Graduate Studies has established the T100 Alumni Mentoring Program, which matches alumni mentors with faculty start-up businesses to “provide strategic advice, preparation for external financing, and business contacts. Regular team meetings are held to advance the commercialization of the technology.”¹⁹

These efforts all generally fit the model, supported by the available evidence, of a university with the core mission of creating and transmitting knowledge. Much of the knowledge created in carrying out this core function has considerable economic value. Establishing University offices for the purpose of facilitating the transfer of the new knowledge to private markets can be profitable for U.Va., but may be of even more value in the recruitment and retention of faculty and in boosting local economic development.

RESEARCH AND EDUCATION AS JOINT PRODUCTS

Probably the greatest distinguishing characteristic of a modern research university such as U.Va. is its concentration of human capital in the form of highly trained and qualified academic faculty. Universities accumu-

late this intellectual capital as the key input in fulfilling their two central missions of creating and disseminating knowledge. In the “academic core”²⁰ of the research university, education and research are joint products where “. . . each is done better when both are done in the same place by the same people.” [Geiger, 1990] Substantial efficiencies and advantages arise in the joint production. [Geiger, 2004]

In the academic core, faculty divide their time between undergraduate education, graduate education, and research. The quality of the faculty, as measured by rankings, research excellence, and ability to mentor the next generation of researchers, is perceived to be an important input to both graduate and undergraduate education. However, faculty competence can only be maintained by sustained high-quality research output. In addition, it will not necessarily be the case that the most effective instructors will be the most productive researchers. Thus, research universities and departments always face a difficult trade-off between the commitment of resources to education and research.

The interests of the faculty and of the university concerning the allocation of time and effort may be very different. A faculty member may often find that personal rewards, both pecuniary and otherwise, will be

20. The *academic core* is defined as the programs that combine teaching and research. It excludes research programs that are independent of the teaching mission.

19. See <http://www.virginia.edu/vprgs/industry/T100/> (12/2/06)

much greater from additional hours of research than from additional hours spent on teaching. The university has a strong interest in maintaining the quality of its education services and, hence, must establish administrative mechanisms for ensuring that faculty activities adequately serve the education mission. Recent surveys indicate that faculty in public research universities dedicate roughly 50 percent more of their work hours to teaching than they do to research.

Due to the research university's comparative advantage in accumulating and managing intellectual resources, public research universities often find themselves struggling to maintain balance in the academic core while addressing increasing demand for research that also serves key state interests. Frequently, universities expand research activities beyond the academic core by establishing research units that do not participate as actively in the education function but rather are dedicated largely to research. Aside from comparative advantages in managing intellectual resources, the proximity of the research unit to the rest of the university brings the additional advantages of increased opportunities for faculty collaboration, graduate student research, and joint use of expensive facilities.

The University of Virginia Health System is, by far, the largest research unit at the University, encompassing a major research hospital, along with schools of medicine and nursing. Founded in 1825 as a medical school and with the addition of the nursing school and the establishment of a hospital in 1901, the Health System has become a major center of medical research with more than \$175 million in external support for research in FY 05. The Health System, then, is a combination of medical education, clinical care, and medical-related research. These functions are complementary, but also compete for resources and for management priority. In particular, there will be important trade-offs between clinical care, with its high immediate returns for patient care, and research, with its lower immediate financial return but important long-term gains for the researcher and the university. The Health System also provides a very significant amount of care for indigent patients, much of which is not fully compensated. The incentives for dedicating resources to the various functions will be different for researchers, clinicians, and management. Forging these disparate resources and functions into a productive unit with maximum value to the University and the state is a key management challenge for the Health System.

INSTITUTIONAL INCENTIVES AND FUTURE ECONOMIC GROWTH

So how can we know whether the University of Virginia is striking the right balance among its various endeavors — its “inputs” and “outputs” — to maximize its value to the state? Clearly, both education and research have value to students, to the local community, and to the state. How do we decide, on the basis of available evidence, the appropriate proportion of faculty time that should be spent on teaching and research? How shall we judge whether a university is actually creating extra value by providing students with classroom instruction by top researchers in fields such as genetics and German?

Unfortunately, it is not possible to make reliable economic judgments about the value at the margin of trading off research effort for teaching effort or, in the Health System, the clinical services function as well. No single statistic can be used to measure success. As we have already noted, both education and research are of considerable value to the state's economy. And yet, there are trade-offs between them. No one performance measure can be used to maximize the value of two different activities. For example, rewarding or punishing a university on the basis of its education performance alone will cause it to under-invest in research. If, on the other hand, you use two or more measures of performance, then someone must determine what weights should be given to each outcome measure.

The second difficulty with assessing university performance in boosting economic value in the state lies with the intractable problem of measuring actual performance. Suppose we wish to assess the value of a U.Va. degree. It would not be helpful merely to measure the knowledge of graduating students, because then the universities that could attract the brightest freshmen would always be among the best, whatever the effectiveness of their teaching. If we look at the difference between freshmen and graduates, then universities might want to avoid the smartest freshmen because, for these students, the university would have less room for adding value. Would you prefer a student who does extremely well on one thing but less well on others or a student who is pretty good at lots of things? If we judge schools on the wages their recent graduates earn, then the universities will certainly want to eliminate divinity and education programs along with most classics departments.

We have good evidence that top-flight research universities can be magnets for economic development within the state, but measuring the actual economic effects of a university research program is particularly daunting because we can never know key facts. Which firms decided to locate in Charlottesville only because the University of Virginia had space at its research park? Which firms found the pool of recent engineering graduate students from the University too attractive to resist when deciding where to locate their research offices? Which information technology employees agreed to move to the state to work because they knew their children would have a great state university to attend? How much better is it to have a department rank of two rather than five?

The key to establishing policies that are likely to maximize the public value of major research universities such as the University of Virginia may lie more in the structure of incentives than in the structure of oversight. Some long-time observers of American academic institutions would probably suggest that we work to continue “. . .the adaptive process that has facilitated the continual renewal of American science.” [Geiger, 2004]

There has been considerable speculation about why American research universities have been able to retain their global dominance through the better part of the last sixty years. The answer that many observers have found convincing is “. . . the decentralized, competitive structure of the university system, which fostered and rewarded innovative and entrepreneurial behavior”[Geiger, 2004, chap. 4]. An intense competition for resources and for professional status occurs among universities, among departments, and among individual faculty and administrators. Research universities are akin to large firms producing two valuable products that are most

efficiently produced in tandem. These firms compete for customers among students and their families, government funding agencies, foundations, and corporations. To each customer, the university provides a different bundle of services.

It is the competition among these university “firms” that gives them incentive continually to innovate, to control costs, and to maximize the value of their effort to their customers. The increased flexibility that Virginia’s universities received under the 2005 restructuring legislation may help them better respond to their competitive challenges.

Given that many states are now making strong research universities central to their economic development plans, competitive pressures may make it difficult for Virginia’s major research universities to maintain their national and international stature. As Virginia government provides a smaller and smaller share of the budgets of the research universities in the state, it is possible that these schools may lose some of their prominence due to the fierce competition among states and schools. This, in turn, would make it more difficult for the state to attract the top students and faculty, with the corresponding reduction in development of knowledge-dependent businesses.

If U.Va. and the other research universities in the state are able to maintain their high rankings in teaching and research in spite of reductions in state support, it will be because they have responded to the competitive pressures by shifting university priorities in ways that will maintain and enhance their status. Success in this competition for academic status will ensure that U.Va. will continue to provide an important contribution to the economy of the state.

APPENDIX A ACKNOWLEDGMENTS

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APPENDIX B: FACULTY AND STAFF SURVEY FORM*

What is your marital status? (Please check one)

- | | | |
|--|----------------------------------|---|
| <input type="checkbox"/> Single | <input type="checkbox"/> Married | <input type="checkbox"/> Partnered, not married |
| <input type="checkbox"/> Separated or divorced | <input type="checkbox"/> Widowed | <input type="checkbox"/> Prefer not to answer |
| <input type="checkbox"/> Other _____ | | |

Where is your local residence? (Note: a Charlottesville mailing address does not necessarily mean you live in the city; e.g., property north of Hydraulic Road is in Albemarle County, as are Ivy Gardens and U-Heights.)

- City of Charlottesville
- Albemarle County
- Greene County
- Fluvanna County
- Nelson County
- None of the above _____

What is your zip code? _____

Do you live in?

- An apartment or house rented from an individual or company
- A house or condominium that you own
- A University-owned apartment or residence hall
- Other _____

If you own your home, what is your best estimate of what you could sell it for (the current market value of your home)?

- | | |
|---|---|
| <input type="checkbox"/> Less than \$50,000 | <input type="checkbox"/> \$300,000 to \$399,000 |
| <input type="checkbox"/> \$50,000 to \$99,999 | <input type="checkbox"/> \$400,000 to \$499,000 |
| <input type="checkbox"/> \$100,000 to \$149,000 | <input type="checkbox"/> \$500,000 to \$750,000 |
| <input type="checkbox"/> \$150,000 to \$199,000 | <input type="checkbox"/> \$750,000 to \$999,000 |
| <input type="checkbox"/> \$200,000 to \$299,000 | <input type="checkbox"/> \$1,000,000 or more |

If you rent your home, what do you pay for rent each month? If you are single and sharing living quarters, please write down only the part that you pay. \$ _____ Per Month

Which of the following utility services are you billed for? (Please check all that apply.) (pop-up for specific locality)

- | | | | |
|--------------------------------------|------------------------------------|--------------------------------|--|
| <input type="checkbox"/> Electric | <input type="checkbox"/> Cable TV | <input type="checkbox"/> Water | <input type="checkbox"/> Cell Phone (434 area code) |
| <input type="checkbox"/> Natural Gas | <input type="checkbox"/> Telephone | <input type="checkbox"/> Sewer | <input type="checkbox"/> High-speed internet service |

*The survey was conducted by the Center for Survey Research, a unit of the Weldon Cooper Center for Public Service. Faculty and staff were separated into three groups—professional, clerical, and service. A sample of five hundred was randomly selected from each group of employees living in the Charlottesville MSA. The surveys for the professional and clerical workers were conducted on the Web. The survey for service workers was distributed in hard copy because it was assumed many service workers would not be regular users of the Internet. The sample did not include medical interns, a group for which address information was limited, nor student wage employees, because they were included in the student survey. Total employment by place of work, excluding those groups, was 14,493, as reported in Table 2.20. Of that number, we estimate 12,905 (89 percent) resided in the MSA. Response rates for the three employee groups were professional, 59.2 percent; clerical, 55.6 percent; and service 42.6 percent.

FACULTY AND STAFF SURVEY FORM (CONTINUED)

If you rent, which of the following are included in your rental payment?

- Electric Cable TV Water Cell Phone (434 area code)
 Natural Gas Telephone Sewer High-speed internet service

What is the total amount you pay for utilities during an average month? If you are single and sharing living quarters, please write down only the part that you pay. \$ _____ Per Month

How many people live in your household (including yourself)? _____

If you have children give the number in your household that are

- Enrolled in public school, grades K-12 _____
Enrolled in private school, grades K-12 _____

If you are married/partnered, is your spouse/partner (please check one)

- A University of Virginia student
 Employed by the University
 Employed in the Charlottesville area but not by the University
 Employed outside the Charlottesville area
 A homemaker
 Unemployed
 Retired or other

What percentage of your household's total wage and salary income (before taxes) comes from the University of Virginia? _____ Percent

If single, do you own a vehicle? _____

If married, how many vehicles are owned by your household? _____

Is/are your vehicle(s) registered locally (which means does it display a tax decal from Charlottesville, Albemarle, Fluvanna, Greene, and Nelson County)?

- Yes No

What is the market value of each vehicle in your household?

- Vehicle 1: _____ Vehicle 2: _____
Vehicle 3: _____ Vehicle 4: _____

How many visitors (parents, friends, etc.) did you have last year from outside the Charlottesville area? Please count each visit separately, even if the same person visits more than once. Only include your visitors, do not include visitors of roommates. _____ Visitors

How many days did your visitors typically stay (per visit)? _____ Days

How often did your visitors stay in a hotel or motel?

- Almost always Most of the time
 Sometimes Never

APPENDIX C STUDENT SURVEY FORM*

INTRO

On behalf of the University of Virginia, the Weldon Cooper Center for Public Service is conducting a study on the economic impact of the University on the state and local economies. As a critical part of the study, we have asked the Center for Survey Research to survey a sample of students concerning items that will help us measure the impact of student earning and expenditure patterns on the economy. Your name was selected at random.

We appreciate your taking a few minutes to complete this Web survey. Because we are surveying only a small sample of students, it is very important that we receive your response so that we can make sound estimates. All personal information will be held in complete confidence and will not be disclosed under any circumstances.

Since it is possible that you may be unsure about some of the dollar amounts requested in the survey, we appreciate your giving your best estimate of those amounts rather than leaving them blank.

PLACE OF RESIDENCE

Where is your local residence? (Please check one)

- 1 City of Charlottesville
- 2 Albemarle County
- 3 Greene County
- 4 Fluvanna County
- 5 Nelson County
- 6 None of the above

[IF RESPONDENT SELECTS 6, THEY ARE INELIGIBLE TO COMPLETE THE SURVEY.]

What is your zip code? _____

How many months each year do you, or will you, live in the Charlottesville area? (Include Charlottesville, Albemarle County, Fluvanna County, Greene County, and Nelson County) _____ Months

MARITAL STATUS

What is your marital status? (Please check one)

- | | |
|---|--|
| <input type="checkbox"/> 1 Single | <input type="checkbox"/> 2 Married |
| <input type="checkbox"/> 3 Partnered, not married | <input type="checkbox"/> 4 Separated or divorced |
| <input type="checkbox"/> 5 Widowed | <input type="checkbox"/> 6 Prefer not to answer |
| <input type="checkbox"/> 7 Other _____ | |

*The survey was conducted on the Web by the Center for Survey Research, a unit of the Weldon Cooper Center for Public Service. Total enrollment was 20,698. The sample was drawn from the 20,202 students living in the Charlottesville MSA. A sample of five hundred for each of four student groups (first-year students, other undergraduates, graduate students, and professional students) was randomly selected. Response rates are reported in Table 2.3.

STUDENT SURVEY FORM (CONTINUED)

VEHICLES

How many vehicles are owned by your household and registered locally (Count only those vehicles that display a tax decal from the City of Charlottesville, Albemarle County, Fluvanna County, Greene County, or Nelson County)? _____

What is the market value of each vehicle registered locally?

- | | |
|--|--|
| <input type="checkbox"/> 1 Less than \$5,000 | <input type="checkbox"/> 2 \$5,000-\$9,999 |
| <input type="checkbox"/> 3 \$10,000-\$14,999 | <input type="checkbox"/> 4 \$15,000-\$19,999 |
| <input type="checkbox"/> 5 \$20,000-\$29,999 | <input type="checkbox"/> 6 \$30,000-39,999 |
| <input type="checkbox"/> 7 \$40,000 or more | <input type="checkbox"/> 8 Don't know |

SINGLE, SEPARATED, DIVORCED, WIDOWED

[IF RESPONDENT SELECTS 1, 4, 5, OR 6 TO MARITAL STATUS, ASK THE FOLLOWING]

Do you own a vehicle?

- 1 Yes 2 No

[IF RESPONDENT SELECTS 1 ASK THE FOLLOWING]

Is your vehicle registered locally (which means it displays a tax decal from Charlottesville, Albemarle, Fluvanna, Greene, or Nelson County)?

- 1 Yes 2 No

[IF RESPONDENT SELECTS 1 ASK THE FOLLOWING]

What is the current market value of your vehicle?

- | | |
|--|--|
| <input type="checkbox"/> 1 Less than \$5,000 | <input type="checkbox"/> 2 \$5,000-\$9,999 |
| <input type="checkbox"/> 3 \$10,000-\$14,999 | <input type="checkbox"/> 4 \$15,000-\$19,999 |
| <input type="checkbox"/> 5 \$20,000-\$29,999 | <input type="checkbox"/> 6 \$30,000-39,999 |
| <input type="checkbox"/> 7 \$40,000 or more | <input type="checkbox"/> 8 Don't know |

TYPE OF RESIDENCE

Do you live in?

- 1 An apartment, room, or house rented from an individual or company
 2 A house or condominium that you own
 3 A University-owned apartment or residence hall
 4 Parents' house
 5 Fraternity or sorority house owned or rented by a Greek organization
 6 Other _____

[IF RESPONDENT SELECTS 1 ASK THE FOLLOWING]

What is the name of your apartment complex? _____

STUDENT SURVEY FORM (CONTINUED)

HOMEOWNERS

[IF RESPONDENT SELECTS 2 TO TYPE OF RESIDENCE, ASK THE FOLLOWING]

What is your best estimate of the current market value of your home (the amount for which you might sell it)?

- | | |
|---|---|
| <input type="checkbox"/> 1 Less than \$50,000 | <input type="checkbox"/> 2 \$50,000 to \$99,999 |
| <input type="checkbox"/> 3 \$100,000 to \$149,999 | <input type="checkbox"/> 4 \$150,000 to \$199,999 |
| <input type="checkbox"/> 5 \$200,000 to \$299,999 | <input type="checkbox"/> 6 \$300,000 to \$399,999 |
| <input type="checkbox"/> 7 \$400,000 to \$499,999 | <input type="checkbox"/> 8 \$500,000 to \$749,999 |
| <input type="checkbox"/> 9 \$750,000 to \$999,999 | <input type="checkbox"/> 10 \$1,000,000 or more |

Which of the following utility services are you billed for?

(Please check all that apply.)

- | | |
|---|--|
| <input type="checkbox"/> 1 Electric | <input type="checkbox"/> 2 Water |
| <input type="checkbox"/> 3 Sewer | <input type="checkbox"/> 4 Natural gas |
| <input type="checkbox"/> 5 Cable television | <input type="checkbox"/> 6 Telephone |
| <input type="checkbox"/> 7 Cell phone (only if 434 area code) | <input type="checkbox"/> 8 High-speed internet |

RENTERS

[IF RESPONDENT SELECTS 1, 3 OR 5 TO TYPE OF RESIDENCE, ASK THE FOLLOWING]

What do you pay for rent each month? (If you are single and sharing living quarters, please indicate only the amount that you pay.) \$ _____ Per month

Which of the following are included in your rental payment?

- | | |
|---|--|
| <input type="checkbox"/> 1 Electric | <input type="checkbox"/> 2 Water |
| <input type="checkbox"/> 3 Sewer | <input type="checkbox"/> 4 Natural gas |
| <input type="checkbox"/> 5 Cable television | <input type="checkbox"/> 6 Telephone |
| <input type="checkbox"/> 7 Cell phone (only if 434 area code) | <input type="checkbox"/> 8 High-speed internet |

HOUSEHOLD MEMBERS

How many people live in your household (including yourself)? _____

Do you have children under the age of 18 in the household?

- | | |
|--------------------------------|-------------------------------|
| <input type="checkbox"/> 1 Yes | <input type="checkbox"/> 2 No |
|--------------------------------|-------------------------------|

[IF RESPONDENT SELECTS 1 ASK THE FOLLOWING]

How many children in your household are enrolled each of the following:

- | | |
|--|-------|
| 1 Number enrolled in public school, grades K-12 | _____ |
| 2 Number enrolled in private school, grades K-12 | _____ |

VISITORS

How many visitors (parents, friends, etc.) have you had in the last twelve months (or since you arrived in Charlottesville) from outside the Charlottesville area? Please count each visit separately, even if the same person visited more than once. Only include your visitors, do not include visitors of roommates.

_____ Visitors

How many days did your visitors typically stay (per visit)? _____ Days

STUDENT SURVEY FORM (CONTINUED)

How often did your visitors stay in a hotel or motel?

- 1 Almost always
 3 Sometimes

- 2 Most of the time
 4 Never

HOUSING AND UTILITIES EXPENSES

Please estimate your average monthly expenditures in the Charlottesville area (Charlottesville, Albemarle, Fluvanna, Greene, and Nelson) paid to the University or local businesses in the following categories. Include entire housing and utility payments regardless of where the check is sent. If you are single, please write down only that part of the expenses you pay.

Rent (total amount paid to landlord)	\$ _____
Mortgage (exclude tax & insurance escrow payments)	\$ _____
Rent paid to fraternity/sorority	\$ _____
Water	\$ _____
Sewer	\$ _____
Natural gas and/or heating oil	\$ _____
Cable television	\$ _____
Telephone	\$ _____
Cell phone (only if 434 area code)	\$ _____

OTHER EXPENSES

Groceries (Do not include meal plan)	\$ _____
University meal plan	\$ _____
Fraternity/sorority meal plan	\$ _____
Restaurants and bars	\$ _____
Entertainment, recreation, and sports (include fraternity/sorority social dues)	\$ _____
Clothing	\$ _____
Laundry/dry cleaning	\$ _____
Medical and dental out of pocket	\$ _____
Pharmacy (prescription and non-prescription)	\$ _____
Books and supplies	\$ _____
General merchandise (household furnishings, electronics, furniture, appliances, etc.)	\$ _____
Motor vehicle purchases, repair, fuel	\$ _____
Local transit	\$ _____
Other personal services (barber shop, beauty shop, fitness)	\$ _____

EMPLOYMENT

Do you have a job locally (not with the University)?

- 1 Yes
 2 No

How many hours do you work at this job each week? _____ Hours per week

What is your hourly wage rate? \$ _____ Per hour

**APPENDIX D:
SEASON TICKET HOLDER SURVEY FORM**



WELDON COOPER
CENTER FOR PUBLIC SERVICE
University of Virginia

February 3, 2006

Dear Virginia Sports Fan:

We are conducting a study for the University of Virginia about its economic impact on the Charlottesville metropolitan area. As part of the study we are including the local spending of Virginia Athletics season ticket holders when they attend games in Charlottesville.

Your name was randomly selected from a list of season ticket holders. Please respond to this brief survey by sending your completed form in the attached prepaid envelope or by faxing the form to us at (434) 982-5536.

The data we obtain from this survey will be treated as confidential and will not be shared. No individual responses will be published.

Your cooperation is greatly appreciated.

Sincerely,

John L. Knapp
Senior Economist
knapp@Virginia.edu

William S. Shobe
Research Director
Business and Economics
shobe@virginia.edu

**APPENDIX D:
SEASON TICKET HOLDER SURVEY FORM* (CONTINUED)**

1. I annually purchase season tickets for:

	<u>Number of Tickets</u>
Football	_____
Men's Basketball	_____
Women's Basketball	_____
Baseball	_____
Men's or Women's Lacrosse	_____
Men's or Women's Soccer	_____

2. In the last twelve months my tickets were used to attend _____ (# of games) in Charlottesville.

3. Excluding the cost of my tickets, I and the other individuals using my tickets spent (best estimate) the following combined total amounts per game for:

Parking \$ _____
(Excluding reserved parking purchased from the Va. Athletics Foundation)

Food and drink at the game \$ _____

Souvenirs at the game \$ _____

Restaurant and fast food meals in the Charlottesville area \$ _____

Lodging in the Charlottesville area \$ _____

Gasoline in the Charlottesville area \$ _____

Gifts, clothing, and other retail purchases in the Charlottesville area \$ _____

Please mail your completed questionnaire in the enclosed envelope or fax it to (434) 982-5536.

* To estimate spending by nonresidents of the Charlottesville MSA at U.Va.-sponsored athletic events we obtained a list of current season-ticket holders from the Department of Athletics. There were 7,724 ticket holders who lived outside the Charlottesville MSA. We drew a random sample of 500 and mailed to them in January 2006 a one-page questionnaire with a postage-paid return envelope. We received 237 responses for a response rate of 47.4 percent.

REFERENCES

GENERAL INFORMATION

- American Automobile Association. 2006. *Tourbook: Mid-Atlantic*.
- Anderson, Melissa S., and James C. Hearn. 1992. "Equity Issues in Higher Education Outcomes." Pp. 301-334 in *The Economics of American Higher Education*, ed. W. E. Becker and D. R. Lewis. Norwell: Kluwer Academic Publishers.
- Association of American Universities. 2003. "Employment Impacts of Academic R&D, Fiscal Year 2001" (August). <http://www.aau.edu/resuniv/FY01Employ.html> (accessed November 1, 2006).
- Auditor of Public Accounts. 2006. *Comparative Report of Local Government Revenues and Expenditures Year Ended June 2005*. Richmond, Virginia.
- Audretsch, David B., and Maryann P. Feldman. 1996a. "Innovative Clusters and the Industry Life Cycle." *Review of Industrial Organization* 11: 253-273.
- . 1996b. "R&D Spillovers and the Geography of Innovation and Production." *The American Economic Review* 86 no. 3: 630-640.
- Badenhausen, Kurt. 2006. "Virginia: The Best State for Business." *Forbes.com*. http://www.forbes.com/2006/08/15/virginia-business-climate_cz_kb_0815virginia.html.
- Bania, Neil, Randall W. Eberts, and Michael S. Fogarty. 1993. "Universities and the Startup of New Companies: Can We Generalize from Route 128 and Silicon Valley?" *The Review of Economics and Statistics* 75 no. 4: 761-766.
- Baum, Sandy. 2004. "Student Financial Aid Policies: Do They Promote Universal Education?" Pp. 7-14 in *Ford Policy Forum 2004*. Cambridge, MA: Forum for the Future of Higher Education. <http://www.educause.edu/ir/library/pdf/fffp043.pdf> (accessed November 2, 2006).
- Becker, Gary. 1964. *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. New York: Columbia University Press.
- Becker, William E. 1992. "Why Go to College? The Value of an Investment in Higher Education." Pp. 91-120 in *The Economics of American Higher Education*, ed. W. E. Becker and D. R. Lewis. Norwell: Kluwer Academic Publishers.
- Becker, William E., and Darrell R. Lewis, eds. 1992. *The Economics of American Higher Education*. Norwell: Kluwer Academic Publishers.
- Berger, Mark C. 1992. "Private Returns to Specific College Majors." Pp. 141-171 in *The Economics of American Higher Education*, ed. W. E. Becker and D. R. Lewis. Norwell: Kluwer Academic Publishers.
- Berman, Evan M. 1990. "The Economic Impact of Industry-Funded University R&D." *Research Policy* 19: 349-355.
- Betz, F. 2001. "Industry-University-Government Research Partnerships for Economic Development in the U.S." Pp. 181ff. in *Doing Business in the Knowledge-Based Economy: Facts and Policy Challenges*, ed. L. Lefebvre, E. Lefebvre, and P. Mohnen. Boston: Kluwer Academic Publishers.
- Blackwell, Melanie, Steven Cobb, and David Weinberg. 2002. "The Economic Impact of Educational Institutions: Issues and Methodology." *Economic Development Quarterly* 16 no. 1 (February): 88-95.

REFERENCES (CONTINUED)

- Blaug, Mark. 1985. "Where Are We Now in the Economics of Education?" *Economics of Education Review* 4(1): 17-28.
- Bound, John, and Sarah Turner. 2006. "Cohort Crowding: How Resources Affect Collegiate Attainment." Working paper 12424, National Bureau of Economic Research (NBER). <http://www.nber.org/papers/w12424> (accessed November 1, 2006).
- Bound, John, Sarah Turner, and Patrick Walsh. 2006. "Internationalization of U.S. Doctorate Education." Unpublished paper. <http://www.nber.org/~sewp/BountTurner022006jbsset.pdf> (accessed November 1, 2006).
- Bound, John, J. Groen, G. Kezdi, and Sarah E. Turner. 2004. "Trade in University Training: Cross-State Variation in the Production and Stock of College-Educated Labor." *Journal of Econometrics* 121: 143-173.
- Branscomb, Lewis M., Fumio Kodama, and Richard Florida. 1999. *Industrializing Knowledge: University-Industry Linkages in Japan and the United States*, Cambridge: MIT Press.
- Breneman, David W. 2001. "The Outputs of Higher Education." Pp. 7-14 in *Ford Policy Forum 2001*. Cambridge, MA: Forum for the Future of Higher Education. <http://www.educause.edu/ir/library/pdf/ffpfp0101.pdf> (accessed November 2, 2006).
- Bureau of Economic Analysis (U.S. Department of Commerce). *Regional Economic Accounts*. "Local Area Personal Income." <http://www.bea.gov/bea/regional/reis/default.cfm#a> (accessed January 9, 2007).
- Caffrey, John, and Herbert H. Isaacs. 1971. *Estimating the Impact of College or University on the Local Economy*. Washington DC: American Council on Education.
- Carnevale, Anthony P. 2006. "Discounting Education's Value." *Chronicle of Higher Education* (September 22). Vol. 53(5): B6.
- Carlino, Gerald A. 1995. "Do Education and Training Lead to Faster Growth in Cities?" *Business Review* (January): 15-22.
- Cohn, Elchanan, and Terry G. Geske. 1992. "Private Nonmonetary Returns to Investment in Higher Education." Pp. 173-195 in *The Economics of American Higher Education*, ed. W. E. Becker and D. R. Lewis. Norwell: Kluwer Academic Publishers.
- Research and Policy Committee of the Committee for Economic Development. *America's Basic Research: Prosperity Through Discovery. A Policy Statement by the Research and Policy Committee of the Committee for Economic Development*. Washington DC: Committee for Economic Development.
- Couturier, Lara K. 2006. *Checks and Balances at Work: The Restructuring of Virginia's Public Higher Education System*. National Center Report #06-3. Washington DC: National Center for Public Policy and Higher Education. http://www.highereducation.org/reports/checks_balances/virginia.pdf (accessed November 1, 2006).
- Dale, Stacy Berg, and Alan B. Krueger. 2002. "Estimating the Payoff to Attending a More Selective College: An Application of Selection on Observables and Unobservables." *Quarterly Journal of Economics*, Nov: 1491-1527.
- Day, Jennifer C., and Eric C. Newburger. 2002. "The Payoff: Educational Attainment and Synthetic Estimates of Work-Life Earnings." *Current Population Reports* (July). Washington DC: United States Bureau of the Census. <http://www.census.gov/prod/2002pubs/p23-210.pdf> (accessed November 1, 2006).

REFERENCES (CONTINUED)

- Dee, Thomas S. 2003. "Are There Civic Returns to Education?" Working paper no. 9588, National Bureau of Economic Research (NBER). Cambridge, MA.
- Ehrenberg, Ronald G. 2001. "The Supply of American Higher Education Institutions." Pp. 15-23 in *Ford Policy Forum 2001*. Cambridge, MA: Forum for the Future of Higher Education. <http://www.educause.edu/ir/library/pdf/fffp0102.pdf> (accessed November 2, 2006).
- . 2004. "Econometric Studies of Higher Education." *Journal of Econometrics* 121: 19-37.
- Ellwood, D., and T. Kane. 2000. "Who Is Getting a College Education? Family Background and the Growing Gaps in Enrollment." In *Securing the Future*, ed. S. Danzinger and J. Waldfogel. Russell Sage Foundation Publications.
- Feller, Irwin. 1990. "Universities as Engines of R&D-Based Economic Growth: They Think They Can." *Research Policy* 19: 335-348.
- Gates, John M., Thomas A. Grigalunas, and Luis F. Vieira. 1984. "Cost Effectiveness of Publicly Funded Research: A Case Study of the United States Academic Research Fleet." *Applied Economics* 16: 355-367.
- Geiger, Roger L. 1990. "Organized Research Units in American Universities: Emergence, Evolution, Significance." *Journal of Higher Education* 61: 1-19.
- . 2004. *Knowledge and Money: Research Universities and the Paradox of the Marketplace*. Stanford: Stanford University Press.
- Glaeser, Edward L., Hedi D. Kallal, et al. 1992. "Growth in Cities." *Journal of Political Economy* 100 no. 6: 1126-1152.
- Glaeser, Edward L., and Albert Saiz. 2003. "The Rise of the Skilled City." *Harvard Institute of Economic Research* (December). <http://post.economics.harvard.edu/hier/2003papers/HIER2025.pdf> (accessed November 2, 2006).
- Glaeser, Edward L., and Jesse Shapiro. 2001. "Is There a New Urbanism? The Growth of U.S. Cities in the 1990s." Working paper no. 8357, National Bureau of Economic Research (NBER). Cambridge, MA. <http://www.nber.org/papers/8357> (accessed November 2, 2006).
- Glaeser, Edward L., José A. Scheinkman, and Andrei Shleifer. 1995. "Economic Growth in a Cross-Section of Cities." *Journal of Monetary Economics* 36: 117-143.
- Gottman, Jean. 1986. "The Role of the University in Modern Urban Development." *Policy Studies Journal* 14 no. 3: 429-436.
- Groen, Jeffrey A., and Michelle J. White. 2004. "In-State versus Out-of-State Students: The Divergence of Interest Between Public Universities and State Governments." *Journal of Public Economics* 88 no. 9-10: 1793-1814.
- Haveman, Robert H., and Barbara L. Wolfe. 1984. "Schooling and Economic Well-Being: The Role of Nonmarket Effects." *Journal of Human Resources* 19(3): 377-407.
- Heckman, James. 2005. "Lessons from the Technology of Skill Formation." Working paper no. 11142, National Bureau of Economic Research (NBER). Cambridge, MA.
- Helms, L. Jay. 1985. "The Effect of State and Local Taxes on Economic Growth: A Time Series-Cross Section Approach." *Review of Economics and Statistics* (November).

REFERENCES (CONTINUED)

- Henderson, Rebecca, Adam B. Jaffe, and Manuel Trajtenberg. 1998. "Universities as a Source of Commercial Technology: A Detailed Analysis of University Patenting, 1965-1988." *The Review of Economics and Statistics* 119-126.
- Heuchert, Dan. 2005. "At Your Service—Students Invest Their Energies in Volunteerism." *Inside UVA* (April). <http://www.virginia.edu/insideuva/2005/06/students.html> (accessed November 1, 2006).
- Hoxby, C. 1997. "How the Changing Market Structure of U.S Higher Education Explains College Tuition." Working paper no. 6323, National Bureau of Economic Research (NBER). Cambridge, MA.
- Hull, Charles L. H., Laura Michael, and Alyse Shorland. 2006. "The Economic Impact of the University of Virginia on the Charlottesville-Albemarle Area." Classroom lecture, University of Virginia (April 28).
- Jaffe, Adam B. 1989. "Real Effects of Academic Research." *The American Economic Review* 79 no. 5: 957-968.
- Jaffe, Adam B., Manuel Trajtenberg, and Rebecca Henderson. 1993. "Geographic Localization of Knowledge Spillovers as Evidenced by Patent Citations." *Quarterly Journal of Economics* 63: 577-598.
- Jones, Bryan D., and Arnold Vedlitz. 1988. "Higher Education Policies and Economic Growth in the American States." *Economic Development Quarterly* 2: 78-87.
- Kane, Thomas J. 2001. "Assessing the American Financial Aid System: What We Know, What We Need to Know." Pp. 25-34 in *Ford Policy Forum 2001*. Cambridge, MA: Forum for the Future of Higher Education. <http://www.educause.edu/ir/library/pdf/ffpfp0103.pdf> (accessed November 2, 2006).
- Kane, Thomas J., and Peter R. Orszag. 2004. "Financing Public Higher Education: Short-Term and Long-term Challenges." Pp. 33-39 in *Ford Policy Forum 2004*. Cambridge, MA: Forum for the Future of Higher Education. <http://www.educause.edu/ir/library/pdf/ffpfp045.pdf> (accessed November 2, 2006).
- Klevatorick, Alvin K., et al. 1995. "On the Sources and Significance of Interindustry Differences in Technological Opportunities." *Research Policy* 24: 185-205.
- Krop, Richard, et al. 2000. "The Return to Increased Public Expenditures on Education." Unpublished RAND draft series paper DRU-2316-CAE. RAND Corporation.
- Lambright, W. Henry, and Albert H. Teich. 1989. "Science, Technology and State Economic Development." *Policy Studies Journal* 18 no. 1 (Fall): 135-147.
- Leslie, Larry L., and Paul T. Brinkman. 1988. *The Economic Value of Higher Education*. New York: Macmillan Publishing Company.
- Leslie, Larry L., and Darrell R. Lewis. 2001. "Economic Magnet and Multiplier Effects of the University of Minnesota." Paper prepared for University of Minnesota symposium (August 23).
- Leslie, Larry L., and Sheila A. Slaughter. 1992. "Higher Education and Regional Development." Pp. 223-252 in *The Economics of American Higher Education*, ed. W. E. Becker and D. R. Lewis. Norwell: Kluwer Academic Publishers.
- Lund, Leonard. 1986. *Locating Corporate R&D Facilities*. Conference Board Report No. 892. Conference Board, New York.
- Malecki, E.J. 1997. *Technology and Economic Development*. 2nd ed. New York: Longman Scientific & Technical.

REFERENCES (CONTINUED)

- Mansfield, Edwin. 1995. "Academic Research Underlying Industrial Innovations: Sources, Characteristics, and Financing." *The Review of Economics and Statistics* 77 no. 1: 55-65.
- McPherson, Michael S., and Morton Owen Schapiro. 2004. "The Promise and Perils of Universal Higher Education." Pp. 3-6 in *Ford Policy Forum 2004*. Cambridge, MA: Forum for the Future of Higher Education. <http://www.educause.edu/ir/library/pdf/fffp042.pdf> (accessed November 2, 2006).
- Mincer, J. 1962. "On-the-Job Training: Costs, Returns, and Some Implications." *Journal of Political Economy* (supplement) 70: 50-79.
- Moretti, Enrico. 2004. "Estimating the Social Return to Higher Education: Evidence from the Longitudinal and Repeated Cross-Sectional Data." *Journal of Econometrics* 121: 175-212.
- Murphy, Kevin M., and Finis Welch. 1992. "Wages of College Graduates." Pp. 121-140 in *The Economics of American Higher Education*, ed. W. E. Becker and D. R. Lewis. Norwell: Kluwer Academic Publishers.
- Nagowski, Mathew P. 2006. "Assessing the Economic Impact of Higher Education in New England." Memorandum, Federal Reserve Bank of Boston (February 22) www.bos.frb.org/economic/neppc/memos/2006/nagowski022206.pdf (accessed May 18, 2007).
- National Science Board (NSB). 2006. *Science and Engineering Indicators, 2006*. Two volumes. National Science Foundation. Arlington, VA. (volume 1, NSB 06-01; volume 2, NSB 06-01A).
- National Institutes of Health. NIH Extramural Awards Ranking Tables Medical Schools Current Data. <http://grants2.nih.gov/grants/award/trends/medschc.htm> (accessed November 1, 2006).
- Rauch, James. "Productivity Gains from Geographic Concentrations of Human Capital: Evidence from the Cities." *Journal of Urban Economics* 34:398-99.
- Rizzo, Michael J. 2005. "The Public Interest in Higher Education." Pp. 19-45 in *Education and Economic Development*, ed. Federal Reserve Bank of Cleveland. <http://www.clevelandfed.org/Research/EdConf2004/Nov/pdf/rizzo.pdf> (accessed November 1, 2006).
- Rosen, Sherwin. 1981. "The Economics of Superstars." *American Economic Review* 71 no. 5:845-858.
- Rosenbaum, James E. 2004. *Universal Higher Education: Challenges and Alternative Strategies for Serving the New College Student*. <http://www.educause.edu/ir/library/pdf/fffp044.pdf> (accessed November 2, 2006).
- Rosenberg, Nathan, and Richard Nelson. 1997. "The Roles of Universities in the Advance of Industrial Technology." *Research Policy* 23.
- Salter, Ammon J., and Ben R. Martin. 2001. "The Economic Benefits of Publicly Funded Basic Research: A Critical Review." *Research Policy* 30: 509-532.
- SCHEV (State Council for Higher Education in Virginia). 2006. "Study on the Affordability of Virginia's Public and Private Institutions." January 10. <http://www.schev.edu/reports/reportsindex.asp>.
- Schuh, G. Edward, and Vernon W. Ruttan. 1992. "The Research and Service Missions of the University." Pp. 69-87 in *The Economics of American Higher Education*, ed. W. E. Becker and D. R. Lewis. Norwell: Kluwer Academic Publishers.

REFERENCES (CONTINUED)

- Schultz, Theodore W. 1961. "Investment in Human Capital." *American Economic Review* 51:1-17.
- Smilor, Raymond W., David V. Gibson, and Glenn B. Dietrich. 1990. "University Spin-Out Companies: Technology Start-ups from UT-Technology." *Journal of Business Venturing* (January).
- Stewart, Thomas A. 2001. *The Wealth of Knowledge: Intellectual Capital and the Twenty-first Century Organization*. New York: Doubleday.
- Stynes, Daniel J. 2001. "Estimating Economic Impacts of Tourist Spending on Local Regions: A Comparison of Satellite and Survey/I-O Approaches." Paper presented at Censtates, TTRA Conference, Lisle, IL, September 20, 2001. <http://www.prr.msu.edu/miteim/censtatsTSA.pdf> (accessed November 1, 2006).
- . Date unknown. "Economic Impacts of Tourism." Unpublished paper used in course *PRR 840, Recreation and Tourism Economics* given by the Department of Community, Agriculture, Recreation and Resource Studies, Michigan State University. <http://www.msu.edu/course/prr/840/econimpact/pdf/ecimpvol1.pdf> (accessed November 1, 2006).
- Topel, Robert. 2005. "The Private and Social Values of Education." Pp. 47-57 in *Education and Economic Development*, ed. Federal Reserve Bank of Cleveland. <http://www.clevelandfed.org/Research/EdConf2004/Nov/pdf/topel.pdf> (accessed November 1, 2006).
- University of Virginia, Office of Institutional Assessment and Studies. *Data Catalog*. "Data Digest: Employees." http://www.web.virginia.edu/iaas/data_catalog/institutional/data_digest/emp_fac_gender.htm (accessed November 3, 2006).
- University of Virginia, Office of Institutional Assessment and Studies. *Data Catalog*. "University of Virginia Data Digest." http://www.web.virginia.edu/iaas/data_catalog/institutional/data_digest/datadigest.htm (accessed November 3, 2006).
- University of Virginia, Office of the President. 2004. *University of Virginia's President's Report, 2003-04*. Charlottesville: Office of University Publications and Development Communications. Available at <http://www.virginia.edu/president/report04/> (accessed November 1, 2006).
- University of Virginia, Office of the President. 2005. *University of Virginia's President's Report, 2004-05*. Charlottesville: Office of University Publications and Development Communications. Available at <http://www.virginia.edu/president/report05/> (accessed November 3, 2006).
- University of Virginia, Vice President for Research and Graduate Studies. *Faculty Recruitment*. "Research." http://www.virginia.edu/vprgs/faculty_recruitment.html (accessed November 3, 2006).
- Varga, Attila. 1997. *Regional Economic Effects of University Research: A Survey*. Regional Research Institute, West Virginia University. <http://www.rri.wvu.edu/wpapers/pdffiles/surveyattila.pdf> (accessed November 3, 2006).
- . 2000. "Local Academic Knowledge Transfers and the Concentration of Economic Activity." *Journal of Regional Science* 40 no. 2: 289-309.
- Virginia Tourism Corporation. *Visitation*. "Profile of Pleasure Visitors." <http://www.vatc.org/research/PleasureRelated/PleasureRelatedProfile.htm> (accessed November 3, 2006).
- Wasylenko, Michael J., and T McGuire. 1985. "Jobs and Taxes: The Effect of the Business Climate on States' Employment Growth Rates." *National Tax Journal* 38(4).

REFERENCES (CONTINUED)

- Watts, Amy L. 2001. *Education and the Common Good: Social Benefits of Higher Education in Kentucky*. Frankfort: Kentucky Long-Term Policy Research Center. <http://www.kltprc.net/books/educationcommongood/EducCommGood.pdf> (accessed November 1, 2006).
- Weisbrod, Burton A. 1962. "Education and Investment in Human Capital." *Journal of Political Economy* (supplement) October: 106-125.
- Whiston, Thomas G., and Roger L. Geiger, eds. 1992. *Research and Higher Education: The United Kingdom and the United States*. Berkshire: Open University Press.
- Yazback, Shadya. 2005. "Losing Its Minds? Evaluating 'Brain Drain' in Ohio." *Economic Commentary* (January 1). http://www.clevelandfed.org/Research/Regional/Features/2005/january/brain_drain.cfm (accessed November 1, 2006).
- Zucker, Lynne G., and Michael R. Darby. 1996. "Star Scientists and Institutional Transformation: Patterns of Invention and Innovation in the Formation of the Biotechnology Industry." *Proceedings of the National Academy of Sciences of the United States of America* 93: 12709-12716.
- Zucker, Lynne G., Michael R. Darby, and Jeff Armstrong. 1998. "Geographically Localized Knowledge: Spillovers or Markets?" *Economic Inquiry* 36 (January): 65-86.
- Zucker, Lynne G., Michael R. Darby, and Marilyn B. Brewer. 1998. "Intellectual Human Capital and the Birth of U.S. Biotechnology Enterprises." *The American Economic Review* 88 no. 1: 290-306.

UNIVERSITY OF VIRGINIA IMPACT STUDIES

- Knapp, John L., Tyler J. Fox, Richard D. McGrath, and Robert W. Cox. 1990. *The University of Virginia's Impact on the Charlottesville Metropolitan Area: A Study for 1989-90*. Charlottesville: Weldon Cooper Center for Public Service.
- May, Eleanor G., and Margo E. Hauk. 1981. *Impact of the University of Virginia on Charlottesville and Albemarle County*. Charlottesville: Tayloe Murphy Institute.
- Tayloe Murphy Institute. 1973. *Economic Impact of the University of Virginia on the Community*. Charlottesville: Tayloe Murphy Institute.

OTHER UNIVERSITY IMPACT STUDIES

- Appleseed Inc. 2004. *Innovation and Opportunity: Harvard University's Impact on the Boston Area Economy*. New York: Appleseed Inc. <http://www.community.harvard.edu/economic.php> (accessed November 1, 2006).
- Beddow, Jason, Jeff Alwang, Gautam Hazarika, Brad Mills, and Joydeep Ghosh. 2000. *The Economic Impact of Virginia Tech on the Local Economy: Technical Report*. Blacksburg: Virginia Polytechnic Institute and State University.
- Jacob France Center. 2002. *Value Added: The Economic Impact of the University of Maryland on the State of Maryland*. The Maryland Business Research Partnership. <http://www.ubalt.edu/jfi/jfc/ewdr.htm> (accessed December 5, 2005).

- James Madison University. 1966. *Economic Impact of James Madison University on the Harrisonburg County Area and the Commonwealth*. <http://www.jmu.edu/instrsrch/resrchstud/economic/econimpt.htm> and <http://www.jmu.edu/instrsrch/resrchstud/economic/ECOIMP02.pdf> (accessed November 1, 2006).
- Luger, Michael, Jun Koo, Jonathan Perry, and Stephen Billings. 2001. *The Economic Impact of the UNC System on the State of North Carolina*. Chapel Hill: Kenan Institute.
- Sedway Group. 2001. *Building the Bay Area's Future: A Study of the Economic Impact of the University of California, Berkeley*. Prepared for: University of California, Berkeley.
- Virginia Business Higher Education Council. 1995. *The Local Economic Impact of Virginia's Public Institutions of Higher Education*. Richmond: Virginia Business Higher Education Council.
- Virginia Commonwealth University. 1992. *The Impact of Virginia Commonwealth University* (Summer 1992) Summary: <http://www.vcu.edu/ireweb/impact/about.htm>. VCU 1999 impact card: <http://www.vcu.edu/ireweb/impactcard/impact99.pdf> (accessed November 1, 2006).
- Washington State University. 1998. *The Economic and Social Impact of Washington State University*. Pullman: Washington State University.
- Weber State University. 1997. *Weber State University's Economic Impact on the Local, Regional and State Economies*. <http://departments.weber.edu/ir/econimp.htm> (accessed November 1, 2006).