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THE IMPACT OF OUT-OF-STATE STUDENTS AND FEDERAL RESEARCH GRANTS IN HIGHER EDUCATION ON THE TENNESSEE ECONOMY

BY
RICK BROOKS

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THE IMPACT OF OUT-OF-STATE STUDENTS AND

FEDERAL RESEARCH GRANTS IN HIGHER EDUCATION

ON THE TENNESSEE ECONOMY

APPROVED:

Dr. Reuben Kyle, Major Professor

Dr. E. Anthon Eff, Committee Member

Dr. James Huffman, Committee Member

Chairman of the Department of Economics and Finance

Dean of the College of Graduate Studies

ABSTRACT

The Economic Impact of Nonresident Student

And Federally Funded Research Expenditures

On The Economy Of Tennessee

By Rick Brooks

This study analyzes the economic impact of two significant non-state sources of direct expenditures associated with the public higher education system in Tennessee: nonresident students and Federally funded research. Specifically, the study examines direct expenditures associated with these sources at six Tennessee Board of Regents institutions and five University of Tennessee System institutions.

While several studies have addressed the significant and varied economic impacts of higher education in Tennessee, (Murray and Mayes 1994; Pascarella and Terenzini 1996; Ukpolo and Dernberg 1998; and, THEC 2000) none of these studies has addressed either of the issues explored in this study.

This study uses input-output methodology to separately assess the total economic impact of each source of funds. Results of the study indicate that the direct and total economic impact of each category of expenditure is quite large. Further, given the estimated total economic impact of nonresident students and the state subsidy cost to educate them, estimated benefit-cost ratios demonstrate that the economic benefit of nonresident student education in Tennessee exceeds its short-term cost.

Nonresident student expenditures for the 2000-01 academic year, and Federal grant and contract revenues for the 1999-00 academic year are examined by this study. Taken separately, the total economic impact on Tennessee's economy of each source of funds considered by this study exceeds $400 million annually during the relevant study period.

Readers interested in economic impact issues in higher education will find the results of this study of particular interest, especially as they relate to higher education in Tennessee. This study and its methodology can also serve as a model for similar research in other states. Additionally, several potential areas for future research along these lines are highlighted and discussed in Chapter 5.

Finally, this study also explores several key policy implications arising from the findings of this study as they relate to current higher education financing issues in Tennessee. Additionally, it explores some simple, straightforward uses of this study and its results for the teaching of economics.

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Second, I wish to thank my late grandfather, Glen Green, who instilled within me the importance of learning, compassion, courtesy, and a respect for others and their ideas. Grandpa always told me he wanted me to make it through life "with a pencil behind my ear," and that's exactly what I have tried to do.

Third, I wish to extend my thanks to the three members of my outstanding dissertation committee for their contributions to this study. To my Chair, Dr. Reuben Kyle, who came up with the idea for this study, and through whose support, suggestions, thoughtful reading and insightful contributions it became a finished product. To Dr. Anthon Eff, for his careful reading and helpful input as part of this project, as well as his many other contributions to my graduate experience at MTSU. And to Dr. James Huffman, for his assistance with the higher education aspects of this study.

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CHAPTER 1

INTRODUCTION

Over the last several decades a host of factors have worked to increase the need for funding at institutions of higher education. During this same period, changes in funding methods and social priorities have decreased the inflow of state funds to the nation's public colleges and universities.[1] Federal, state, and local government, as well as the private sector, continue to wrestle with finding ways to adequately fund higher education while facing growing pressure to fund other new and existing programs in ways commensurate with their needs.[2] Attempting to do all of this in an era when additional tax dollars are increasingly hard to come by has served to further complicate the situation.

The increased competition for tax dollars has given rise to heightened cost versus benefit consideration when allocating the pool of public funds available to fund needed and wanted social programs, including higher education. This situation has prompted many institutions of higher education to attempt to quantify their economic and social value to their respective community, region, and state (Dean 1991). Armed with such information, these institutions are, it is thought, better equipped to compete for a larger slice of a funding pie that seems to be shrinking each year. In fact, there are several

[1] McKeown-Moak (1999) notes that in 1981, state appropriations and tuition revenue contributed 44 percent and 12.9 percent respectively to total revenues at public four-year institutions. By 1995, the state appropriation share had decreased to 33 percent while the tuition share had increased to 18.4 percent.
[2] Serban and Burke (1998) indicate that higher education spending decreased from 12.3 percent of state spending in 1987 to 10.3 percent by 1995.

potential advantages of conducting an economic impact study. Kinnick and Walleri (1987) highlight that an economic impact study can:

- Help the public to understand that higher education does not operate in a vacuum.
- Demonstrate that higher education makes a positive contribution to the economy.
- Influence attitudes of business leaders, using language they understand – dollars and cents – about the value of higher education.
- Influence voters and legislators to continue support.

In a survey of 26 California community college presidents, Piland and Butte (1992) found that community reaction to the published results of an economic impact study is often quite favorable. Additionally, the community's favorable reaction more often than not resulted in positive changes in the overall attitude toward the local college.

Another related outgrowth of heightened cost versus benefit thinking regarding the allocation of public funds is the notion that since students are the primary beneficiaries of higher education, they should bear more of the cost. Perhaps a part of this thinking is evidenced by the renewed efforts of many states to increase the tuition rates paid by nonresident students.

As increasing numbers of institutions of higher education have engaged in studies intended to demonstrate their economic and social value to their respective constituencies, it has become clearer than ever that a college or university has a significant, positive economic impact on its community, region, and state. Whether

through salaries paid to faculty and staff members, spending by students and the visitors they bring in, expenditures from research activities, *et cetera*, or through increased attractiveness to industry, providing a better trained local workforce, or increased access to fine arts, a college or university pumps large numbers of dollars into a local, regional and state economy. As these dollars change hands, their impact continues to multiply throughout the economy.

1. Purpose of the Study

The purpose of this study is to analyze the economic impact of direct expenditures associated with four-year, public higher education in Tennessee and arising from two primary non-state sources: nonresident students and Federally funded research. The study examines data from six public universities overseen by the Tennessee Board of Regents (TBR) and four public universities overseen by the University of Tennessee (UT) System.

Specifically, the study utilizes an input-output modeling approach with associated multipliers for the state of Tennessee to estimate the total economic impact on the state's economy of direct expenditures at four-year, public higher education institutions resulting from:

- Nonresident student expenditures on tuition and fees, books and supplies, living expenses, personal expenses, and transportation; and,
- University research expenditures funded by the Federal government.

2. Limitations of the Study

This study and its associated findings are limited by several factors. The first group of limiting factors is associated with the modeling approach utilized by the study. The second group of limiting factors includes areas of significant economic impact associated with four-year, public higher education in Tennessee that are not analyzed as part of this study.

2.1 Limitations of the Modeling Approach

There are at least two key limitations associated with the input-output modeling approach utilized by this study. An understanding of these limitations is necessary to ensure an accurate interpretation of the results of the analysis undertaken herein. To that end, each of these limitations is discussed below.

First, the economic impact(s) identified by input-output modeling are limited by both space and time. This approach is designed to analyze the impact of some economic event in a given place and time, and does not attempt to account for impacts in other regions or time periods. Analyzing "spillover" effects to other states requires large amounts of costly data and significant computational time. Analyzing how economic impacts today extend into the future is not yet possible with conventional input-output modeling software.

Second, economic impact models require a large amount of data to accurately estimate total economic impacts. Since much of the relevant data is published infrequently and subject to revision, there is often a time lag inherent in collecting it. In

order to match data as closely as possible, this study examines enrollments, research funding, and expenditures using historical data. Because of this limitation, the findings of this study should serve as an estimate of current or future impacts only in the absence of significant structural changes.

2.2 Impacts Not Addressed By This Study

First, this study makes no attempt to calculate rates-of-return to higher education for the individual or state. The analysis of this study is confined to expenditure impacts only, and does not consider the increase in income attributable to higher education or additional state tax revenue generated by it.

Second, this study does not analyze the economic impact of federal financial aid dollars flowing into the state of Tennessee. While the economic impact of these funds is undoubtedly significant and wide ranging, a complete analysis of the extent and nature of those impacts is deemed beyond the scope of this investigation.

Third, this study does not attempt to measure the economic impact of expenditures made by non-Tennessee residents undergoing diagnosis or treatment at medical facilities associated with public higher education institutions in Tennessee. The University of Tennessee Health Sciences Center and the James H. Quillen College of Medicine at East Tennessee State University annually provide services to a host of nonresident patients. Any attempt to accurately identify the actual expenditures made by such patients would require an extremely complicated case-by-case analysis involving access to private information.

Fourth, this study does not attempt to measure the economic impact of expenditures made by visitors associated with the institutions under study. While Murray and Mayes' (1994) study of the University of Tennessee indicates that visitors do have a significant economic impact, it would be difficult at best to derive an accurate breakdown of the number of visitors who come solely from out-of-state or those who are exclusively associated with nonresident students studying in Tennessee.

Fifth, this study does not seek to analyze the economic impact of out-of-state funded research expenditures made by the Oak Ridge National Laboratory. The analysis undertaken by this study is confined only to that of public institutions of higher education.

3. Organization of the Study

This study is organized into five chapters. Chapter 2 includes a review of the literature on economic impact studies of higher education. The review includes a survey of various models and approaches that have been used to conduct such studies. Additionally, it summarizes several studies investigating the economic impact of a single institution of higher education as well as others focusing on a state's entire system of higher education. Finally, the review summarizes the findings of several studies related to the economic impact of both nonresident students and university research expenditures.

Chapter 3 presents the research methodology used in this study. This chapter includes a description of the specific input-output model used in this study. It also

includes a discussion of the data analyzed by this study, sources for and limitations of the data, and relevant assumptions used in analyzing it.

Chapter 4 presents the findings of this study. Results of the input-output analysis, including direct, indirect, induced, and total economic impacts of the two expenditure sources studied are included and interpreted.

Chapter 5 presents a summary of the study and addresses some educational applications of the study and its methodology. Specifically, it highlights aspects of the study and its results that may be of use to state legislators and educational policymakers. Also, it discusses relevant applications to the pedagogy of economics and higher education policy.

CHAPTER 2

REVIEW OF THE LITERATURE

The objective of an economic impact study of an institution of higher education is to measure the increase in economic activity attributable to the existence of the college or university (Elliot, Levin, and Meisel 1988). According to Salley (1976), the concepts of economic base theory and local multipliers are at the root of economic impact studies of this type. The local college or university provides a base of specialized activities for which demand exceeds local consumption, and therefore creates a flow of money income from non-local sources. Income, both local and non-local, to the institution flows out from it as wages and purchases, the impact of which is multiplied throughout the surrounding area(s) as it changes hands (Salley 1976).

The area of economic impact under consideration can range from the immediate community, the surrounding region, or the state as a whole (Goldstein 1990; Bluestone 1993; Johnson 1994). Also, the impact study can investigate the impact of a single institution, a group of institutions, or the impact of an entire statewide system of public higher education.

Attempts to quantify the actual economic impact of a college or university have included a variety of methods and measures. Because of this, many early economic impact studies arrived at results that, because of differences in assumptions or measures, were difficult to compare across institutions, or were of little economic consequence

(Fink 1976). The 1971 publication of Caffrey and Isaacs' how-to manual by the American Council on Education (ACE) provided a much-needed methodological benchmark for such studies, the result of which was a significant increase in the number of economic impact studies of institutions of higher education. Indeed, the Caffrey-Isaacs method has been the preferred approach for economic impact studies of higher education since its creation (Elliot, Levin, and Meisel 1988).

While it may be true that the Caffrey-Isaacs model is the most prevalent method, the existing literature demonstrates that economic impact studies have been approached in a variety of ways. Among those approaches are:

- The deterministic model suggested by Caffrey and Isaacs (1971), which accounts for both positive and negative regional economic impacts.
- Economic base models as surveyed by Salley (1978).
- Cost-versus-benefit approaches such as that used by Smith and Bissonnette (1989).
- Input-output analysis *`a la* Leontief (1936) as utilized by Goldstein (1990) and others.
- Estimation via econometric analysis as seen in Fishkind, Milliman, and Ellsen (1978); Engler, Firnberg, and Kuhn (1980); Olson (1981); Brown and Johnson (1987); and Gana (1993).
- The net impact investment approach as utilized by Bluestone (1993).

In order to survey the literature on economic impact studies of higher education, this chapter will be divided into five key sections:

- Models for assessing the economic impact of an institution of higher education and related research.
- Studies focusing on the economic impact of a single college or university.
- Studies focusing on the economic impact of a state's entire system of public higher education.
- Studies related to the economic impact of nonresident students
- Studies related to the economic impact of university research.

1. Models and Related Research

The literature demonstrates that economic impact studies of institutions of higher education have utilized a variety of models. The purpose of this section is to discuss several of the more prominent models along with examples of their applications. When relevant, criticisms of the models are also discussed.

1.1. The Caffrey-Isaacs Model

Since 1971, a significant number of economic impact studies of institutions of higher education have used as a starting point the Caffrey-Isaacs model (also known as the ACE model) for economic impact studies (Fink 1976; Leslie and Brinkman 1993). Indeed, it was this model that first provided researchers with a how-to guide for engaging in an economic impact study of a college or university. The impact of this model has been so pervasive that a 1985 survey of colleges and universities in the

United States showed that 46 percent had conducted an economic impact study of some type, and a majority of these utilized the Caffrey-Isaacs model (El-Khawas 1986).

Among a host of written guidance, the study also included several worksheets designed to assist researchers in gathering and assessing relevant information, hints about where to get information, and even suggested forms for mail and telephone surveys.

The fundamental starting point of the Caffrey-Isaacs model is the recognition that a university has four associated groups of spenders: The university itself, faculty and staff, students, and visitors. Spending from these four groups flows out into local businesses, local individuals, and the local government, thus creating direct and indirect benefits that are multiplied as the process continues. The impact on local businesses includes the net effects on business volume, local business property, and local banks' credit bases. The impact on local individuals includes net effects on employment, income, and purchases of durable goods. Lastly, the impact on local government includes the net effects on revenues, assets, and costs of municipal services and schools.

One key limitation of the Caffrey-Isaacs model, admitted to even by its creators, is that it is short-range in nature (Caffrey and Isaacs 1971). The model ignores long range impacts related to the enhancement of local workers' skills, the relationship between research and local industry, and the effect on business location (Elliot, Levin, and Meisel 1988). Due to this fact, a related body of literature has begun to focus on the long-term impact of colleges and universities on regional economic development (Elliot, Levin, and Meisel 1988; Zumeta and Stephens 1987; Palmer 1978; Pennsylvania

Economy League 1982; National Association of State Universities and Land-Grant Colleges 1997).

As an example of the value of such long-term impacts, a 1997 study by the National Association of State Universities and Land-Grant Colleges details that the University of Tennessee engaged in sponsored research totaling $150.8 million in 1992-93. In addition to this, between 1985 and 1993 UT's Procurement Technical Assistance Program helped state industries acquire $405 million in prime and subcontracts.

Also in regard to such long-term impacts, Chamberlin (1983) notes that such factors as increased lifetime earnings, job satisfaction, personal satisfaction, and service to society by college graduates are positive economic benefits that are not accounted for in economic impact studies. These, along with the presence of libraries and museums and activities such as lecture series and the performing arts bring positive benefits to the university's community, but the economic value of such benefits are difficult to measure.

As an example of studies that have criticized the Caffrey-Isaacs model, Palmer (1978) offers several adjustments to the model based on her 1975-76 study of the regional economic impact of the University of Pittsburgh. The adjustments she offers extend from revisions to sections of the Caffrey-Isaacs model to the inclusion of additional variables not found in it. Some of the revisions offered by Palmer are:

- When estimating the tax loss to local government, the Caffrey-Isaacs model uses an acreage basis for calculating the hypothetical taxes a university would pay if it were not tax exempt, which, according to Palmer is not accurate for urban areas. A better method, it is argued, would be to consider building and

land values separately, using as estimates the book value of buildings and an average of the fair market value and assessed value of land. Using this method, the hypothetical value of the tax loss associated with UP would have been 14 times higher than suggested by the Caffrey-Isaacs model.

- Estimation of the financial impacts of a university should account for fractional reserve banking. Accounting for this would have resulted in a financial impact of UP five times greater than that estimated by the Caffrey-Isaacs model.
- The model should be revised so that employee spending is not equated with take-home pay, and an allowance for saving is included.
- The model should be adjusted to account for potential differences in spending patterns of full- and part-time employees.

Among additions to the model, Palmer offers:

- The addition of the measurement of human capital, namely through the increased lifetime earnings of graduates, should also be considered. Inclusion of increased lifetime earnings of UP graduates would have reflected $4.9 billion incremental lifetime taxable income to the city and $6.7 billion to UP's home county (Palmer 1978).
- Consideration of the fact that a local university tends to have a positive impact on local property values – an impact that results in higher property tax collections. This positive impact helps to offset some of the negative impact of property tax loss from the university campus. According to Palmer, a

conservative estimate indicates that local government receives some $1.7 million annually in additional revenue because of the UP's positive impact on the area's tax base.

- Quantification and inclusion of the value of community services, such as clinics, training programs, lecture series, conferences, use of facilities, and increased security, from which the community benefits and, presumably, the local government is relieved of some cost. Palmer notes that the annual value of services donated to the community by UP exceeds $4 million.
- Quantification and inclusion of the value of university consulting services. Palmer estimates that at UP, university-supported public service saves the community in excess of $250,000 annually.
- Inclusion of university construction spending, including local permit fees.
- Inclusion of mortgage interest paid by university employees, and the imputed rental value of their homes.
- Inclusion of the value of local investments held by the university.

1.2. The Economic Base Approach

In the words of Salley (1976), "An area's economic base consists of the specialized economic activities that produce for a demand that exceeds local consumption." To that extent, a local university provides a base of specialized services such as education and research that are consumed locally as well as exported to nonresident students and organizations from other areas or states.

As funds flow into the university and its students from local and non-local sources they flow out again in wages and purchases, mostly in the local economy. The effects of the outflow of funds are multiplied through the economy as funds from original wages and purchases induce additional wages and purchases in other sectors. The induced wages and purchases also result in increased tax collections via state sales and/or income taxes.

Methodologically speaking, the economic base approach is much akin to the Caffrey-Isaacs model, and studies of this type seem to proceed along a similar vein. The key difference is their respective view on the role of the college or university. The latter views the university and its associated constituents as spenders, while the former views it as a specialized "firm." In reality, the two may best be described as differing in view rather than approach.

1.3. The Cost-versus-Benefit Approach

The cost-versus-benefit approach is highlighted by Smith and Bissonnette's (1989) study of the impact of nonresident students on West Virginia's economy. Their approach rests on the notion that while higher education is quite costly it also provides many benefits, and that an accurate assessment of both is needed to insure proper guidance for decision-making. In particular, decisions regarding tuition for nonresident students present a situation where such an analysis can be extremely beneficial.

According to Smith and Bissonnette, many states view nonresident students as an economic burden, and have sought to pass along the higher cost of education to such

students via increased nonresident tuition rates. The notion that tuition rates are well below the cost of educating nonresident students has led to the view that one state is subsidizing another when educating a nonresident student. This view, however, fails to account for the many positive economic benefits that nonresident students bring to the host state's economy.

Smith and Bissonnette (1989) begin by estimating the direct impact of tuition and fees, living expenses, and visitor expenditures generated by nonresident students. For the study period of 1985-86, the total economic benefit was estimated to be some $86.6 million. The associated cost of educating nonresident students during that same period was estimated to be $28.6 million. From these data they calculate a benefit-cost ratio of 3.02. This ratio indicates that for each dollar invested in a nonresident student the state of West Virginia reaps $3.02 in positive economic benefits over one, ten-month academic year.

1.4. The Input-Output Approach

Goldstein (1990) utilizes a regional input-output approach to analyze the economic impact of the University of North Carolina at Chapel Hill's (UNC-CH) sponsored research budget for 1983. According to Goldstein (1990), "A regional input-output model is designed to estimate the indirect impact of a properly and carefully specified direct or initial impact experienced in one or more industry sectors within a region." The extent of the indirect impact depends upon the magnitude of the various

regional multipliers that link the direct and indirect impacts. Specifically, Goldstein uses the *Regional Input-Ouptut Modelling System* (RIMS II) from the U.S. Department of Commerce, Bureau of Economic Analysis for estimating the indirect impacts in the study.[1]

The findings of the study indicate that the direct input of $26.6 million in research expenditures generated an additional $26.8 million in indirect and induced expenditure output during 1983. The total output impact of $53.4 million was based on a regional multiplier of 2.01.

Along with the illustration of the input-output approach as applied to UNC-CH, Goldstein also highlights several important issues relating to the limitations and interpretation of the results of such studies. Among those issues are:

- Input-output studies require a very large amount of information in order to estimate the relevant multipliers, so there is often a significant time lag between when the information is collected and when the model can be estimated.
- The results of input-output studies are frequently interpreted as though none of the economic impact would have been present in the absence of the institution under study. This interpretation ignores the fact that alternative uses of the funds had the institution not existed would have also generated some direct and indirect economic impact(s). The economic impact of a college or university extends beyond that which can be accounted for by

[1] Specifically, Goldstein uses the 1986 version of the RIMS II model.

input-output modeling. Input-output analysis is often unable to capture economic effects outside of the region or time period under study.

- Input-output analysis does not account for such factors as business relocation to the area where a college or university exists in order to benefit from its specialized services (i.e., cultural activities, skilled labor pool), nor does it account for unsold technology transfers which may increase the productivity of local business.
- The expenses associated with gathering the relevant data or purchasing a software package to analyze them once they have been collected can be prohibitive for smaller institutions.

1.5. The Econometric Estimation Approach

A handful of economic impact studies have broken with more traditional approaches to utilize econometric methods and models for assessing the impact of a college or university. As an example of such studies, Gana (1993) utilizes linear regression to estimate the economic impact of the University of Delaware (UD).

Specifically, he uses linear regression on a set of predetermined endogenous and exogenous variables to arrive at multipliers for calculating the induced impact of spending by UD resident student and employees and nonresident students. Results are found to be consistent with earlier studies on the university utilizing different approaches (Gana 1993).

On the use of econometric estimation for such studies, Gana (1993) notes several important considerations. Among those are:

- Stepwise regression should be avoided during the selection of exogenous variables because of its potential problems related to multicollinearity.
- Ridge regression can be used to avoid problems with multicollinearity, even if ridge estimates are not desired.
- When selecting among possible subsets of exogenous variables, it is often difficult to arrive at an *a priori* set of structural equations that define the institution's impact. One should, therefore, select the plausible subset with the smallest mean square error (MSE).
- Three-stage least squares (3SLS) is used to re-estimate any set of simultaneous equations selected via the smallest MSE criteria. Ridge 3SLS (R3SLS) can be used if multicollinearity is a problem.
- If 3SLS or R3SLS is used, appropriate tests for statistical significance in such cases must also be used.
- Some of the estimated coefficients in the regression will be interpreted as partial derivatives. Interpretation of such coefficients should be done with great care to avoid abuse or faulty conclusions.
- If done properly, the econometric estimation approach can offer the institution an accurate, low-cost alternative to estimation via Caffrey-Isaacs type models.

1.6. The Net Impact Investment Approach

Bluestone (1993) characterizes the Caffrey-Isaacs method as a total value approach that seeks to quantify the total economic impact of a university's existence. A fundamental flaw of this approach, he argues, is that it completely ignores the fact that some of the expenditures (i.e., housing and food) made by resident students would have also been made in the absence of the university. Furthermore, it ignores the fact that local taxpayers would face a smaller tax burden in the absence of the university, and would likely spend the savings in the community as well.

In view of the weaknesses outlined above, Bluestone posits that a more accurate picture of the economic impact of a university can be gained by finding the net rather than total impact of the university. Additionally, he argues that an accurate picture of the true value of a university must include an analysis of the benefits stemming from the increased lifetime working income of the university's graduates.

The net impact investment model as outlined by Bluestone in his 1993 study of the economic impact of the University of Massachusetts at Boston includes the following characteristics:

- A measurement of the present discounted value of incremental state income and sales taxes resulting from the increased earnings of UMB students who remain in-state after leaving the university.
- A measurement of the net difference between the state support of UMB and the present discounted value of the additional tax revenue.

- The incremental value of export base income as a result of out-of-state income brought in by UMB.

The first two categories outlined above are viewed as a type of investment income. Specifically, state funds invested in UMB are recouped over time through the additional tax collections resulting from the higher incomes of students who come through the university's doors and remain in the state to work. Viewing the university as an investment rather than simply as an export base for attracting out-of-state dollars, he argues, is a fundamental departure from the more traditional Caffrey-Isaacs approach.

2. The Economic Impact of a Single Institution

As has already been noted, the economic impact of a single college or university has the potential to be quite large. The purpose of this section is to survey the findings of several economic impact studies of a single college or university.

2.1. The University of Massachusetts/Boston

In a 1993 study of the University of Massachusetts/Boston, Bluestone measures three economic contributions of the university: (1) the additional income generated by students as a result of their university education; (2) additional state income and sales tax revenue generated by these student as a result of their additional income; and, (3) the export base income and tax revenue generated from non-resident tuition, fees, and

living expenses; gifts and unrestricted funds from out-of-state sources; student federal grants-in-aid; out-of-state grants and contracts; and federal endowment income.

The focus of Bluestone's approach involved the capture of the net or incremental value of UMB, rather than its total value as measured by the Caffrey-Isaacs approach. Additionally, by incorporating measures of the value of students' increased lifetime working incomes and the incremental tax dollars generated by them, the rate of return on the state's investment in UMB is calculated.

Findings of the study indicate that over their working lives, the fall 1991 entering class of 2,572 would add approximately $1.05 billion to the income stream in Massachusetts, an effect that would be multiplied to an overall impact of $1.4 billion. Additionally, while the entering class would cost the state an estimated $34.1 million, the increased future income stream would yield approximately $53.5 million in additional state tax revenue. Based on these figures, the state of Massachusetts receives an added $1.57 in state tax revenue for every $1 spent on educating UMB students.

The export base of non-resident students and out-of-state funding added an additional direct impact of $25.6 million to the state economy which, when multiplied out, resulted in an estimated overall impact of $34.3 million. In investment terms, the result was found to yield a rate of return to the state government of 8.9 percent.

2.2. New Mexico State University

A 1993 study of New Mexico State University at Alamogordo (NMSU-A) and four other public education institutions estimates that the total direct impact of NMSU-A

was approximately $7.1 million which, when multiplied out, resulted in an overall impact of $14.4 million on the state economy (Lillibridge 1995). NMSU alone was responsible for 372 of 1,154 jobs accounted for by the five institutions. Students accounted for approximately 72 percent of the impact of NMSU-A.

Several key areas not included in the study included the impact of expansion of local banks' credit base due to university employee deposits, expenditures by visitors, and state and local taxes paid by employees. Omission of such factors likely caused researchers to underestimate the impact of NMSU.

2.3. The University of Memphis

A 1995 study detailing the impact of the University of Memphis classified the direct impacts of the university into four areas: (1) university expenditures (2) faculty and staff incomes (3) student incomes, and (4) visitor expenditures (Pascarella and Terenzini 1996). During the research period, university expenditures totaled $42 million and salaries paid to faculty and staff totaled $111 million. In addition, students at the university earned an estimated $175 million in wages, and visitors to the university spent an estimated $13 million in the Memphis economy (Pascarella and Terenzini 1996).

Compiling the figures listed above, they estimate the university had a direct impact of $341 million and an associated indirect impact of $433 million. The two figures were combined to estimate the university's overall impact at $774 million.

2.4. The University of Delaware

Using an econometric model, Gana (1993) studies the economic impact of the University of Delaware (UD) on the state of Delaware's economy for the period 1991-92. At that time, the university's enrollment consisted of 11,235 nonresident and 9,633 resident students. The university also employed some 3, 651 persons.

During the study period the university expended some $290 million in operating and educational expenditures, including $194 million in salaries, wages, and benefits for the university's employees. Of the total amount, $68 million was funded by state appropriations.

The study concludes that during the 1991-92 period, UD students and employees induced a total of $87 million in wages and salaries in other sectors of state's economy. Of the total induced impact, students accounted for $27 million and employees accounted for the remaining $60 million. Additionally, of the $27 million impact accounted for by students, $18 million is attributed to nonresident students.

2.5. North Carolina A & T State University

Morse, Sakano, and Price (1995) use the 1992 version of the RIMS II modeling system to investigate the economic impact of North Carolina A & T State University (NCATSU) on the local and state economy. Using the results of their 1995 study, along with similar studies on two other North Carolina universities by Williams (1994) and Goldstein and Luger (1992), Morse, Sakano, and Price (1996) attempt to demonstrate that

the economic impact value of an historically black college rivals that of its historically white counterparts.

During 1994-95, NCATSU, and its employees, students and visitors directly expended some $157.7 million in the local and state economy, the total impact of which was deemed to be slightly more than $296 million. Additionally, the university was found to account for an estimated 6,140 additional jobs in the state economy (Morse, Sakano, and Price 1995).

To assess the relative impact of NCATSU against that of historically white colleges, the study compares the university to two of its counterparts – the University of North Carolina-Greensboro (UNCG) and the University of North Carolina-Chapel Hill (UNC-CH). Findings indicate that for each dollar appropriated to NCATSU, the state realizes $5.26 in income. By contrast, similar appropriations for UNCG and UNC-CH result in returns of $2.75 and $2.04 respectively. At least part of the substantial difference in impacts seems to be due to a comparatively low level of state appropriations to NCATSU.

2.6. Jefferson College

In a 1998 study analyzing the economic impact of Jefferson College, the college's Office of Research and Planning (ORP) estimates that for the 1996-97 period, the college had a total expenditure impact of $20.5 million on the surrounding community. Of the total impact, $10.8 million was direct and the remaining $9.7 million was induced.

Additionally, the ORP estimates that the college's direct 244 full-time and 589 part-time jobs support another 756 jobs in the local and state economy.

Due to the college's positive impact on students' lifetime working income, the study estimates that the state of Missouri will collect an additional $5.7 million in sales tax revenue. The students' increased income will also generate an estimated $10.5 million in additional state income tax revenue.

The study also examines two aspects of the college's nature as an export base. During the study period, the college brought in $3.3 million in federal financial aid and an additional $2.9 million in federal and state research grants and contracts. The study assumes, and perhaps rightly so, that these are dollars that would not have flowed into the community if the college had not existed.

An interesting aspect of this study is its attempt to quantify the annual cost to a local resident or family to support the college. Based on the assessed value of real property holdings and the 1996 tax levy for Jefferson College of $0.23 for every $100 of assessed value, the study estimates that the annual cost to an average resident or family to support the college was $39.37. While this estimation in all likelihood does not fully reflect the total cost of supporting the college to the average resident or family, it does demonstrate that there is also a positive tradeoff for members of the local community.[2]

[2] Palmer (1978) gives evidence that the assessed values of real property surrounding a university are typically higher than those in the surrounding community. Given this fact, a resident or family enjoys higher property values, but pays higher taxes both to support the university *and* because of the university.

2.7. Other Findings

A 1997 survey by the National Association of State Universities and Land-Grant Colleges (NASULGC) highlights the respective economic impacts of several colleges and universities. The survey includes findings by geographic region, including the Southeast United States. Table 2-01 provides a summary of the results of a $1.00 investment in selected Southeastern Universities.

Table 2-01 NASULGC 1997 Study Findings for Selected Southeastern Universities

Effect of $1 invested in:	Generates Additional Spending in the State Economy Amounting to:
University of Alabama	$3.00
Auburn University	2.75
University of Arkansas	2.35
University of Central Florida	4.00
University of Florida	5.00
Florida State University	1.47
University of Houston	2.30
University of Kentucky	3.40
Mississippi State University	2.18
University of North Carolina – Chapel Hill	4.00
University of Tennessee	3.00

Findings of the survey indicate that the additional spending impact of a $1.00 investment in the selected universities ranges from as low as $1.47 for Florida State University to as high as $5.00 for the University of Florida. The average impact across all of these universities is slightly in excess of $3.00.

One potential weakness of these reported results arises from the fact that they are calculated and supplied by the institutions themselves, and hence lack any standardized method of calculation. Because of the wide variation of survey findings and lack of

standardized measurement approach, some caution should be used in making comparisons based on this survey.

2.8. Summary of Institution Studies

Institution-level studies of the economic impact(s) of higher education clearly demonstrate that a college or university can provide a powerful economic stimulus to the local and state economy. Table 2-02 summarizes the economic impact(s) identified by the institution-level studies in this section.

Table 2-02 Summary of Institution Studies

Study:	Type of Impact:	Amount of Impact[1] Direct:	Total:
Univ. of Massachusetts/Boston (1993)	Income	$1,005.0	$1,400.0
New Mexico State Univ. (1995)	Expenditure	7.1	14.4
Univ. of Memphis (1996)	Expenditure	341.0	774.0
Univ. of Delaware (1993)	Expenditure	290.0	377.0
North Carolina A&T State Univ. (1995)	Expenditure	157.7	296.0
Jefferson Coll. (1998)	Expenditure	10.8	20.5

[1] Dollar figures are in millions.

3. The Economic Impact of a System of Higher Education

While many economic impact studies focus on the impact of a single college or university, it is also possible to use the same approach to analyze the impact of a state's entire system of higher education. The following sections highlight the findings of several studies of this type.

3.1. Arkansas Study

Kennedy (1985) utilizes the Caffrey-Isaacs model to analyze the economic impact of nine higher education institutions in the state of Arkansas in 1982-83. During the study period, the Arkansas higher education system included approximately 46,500 full-time-equivalent (FTE) students and 8,843 employees.

Findings of the study indicate that Arkansas universities accounted for an estimated total impact of $940 million, or approximately 3.1 percent of the state's gross product during 1982-83. Of the total $940 million impact, $400 million was accounted for by expenditures of the university system, $300 million by individuals other than those associated with the university system, and $240 million by related sectors in support of the university system. Using the data on expenditure impact and full-time enrollment, the impact amounted to some $20,000 per FTE student (Kennedy 1985).

With regard to employment and income, it is concluded that the presence of the university system accounted for just over 36,000 jobs in the state of Arkansas, and $400 million in personal income. Using again the data on FTE students, this equates to eight jobs and $9,000 in income for every 10 FTE students in the university system. Additionally, for every person employed in the state's higher education system, three more persons were employed as a result of university-related expenditures (Kennedy 1985). This total employment impact equates to approximately 3.47 percent of the Arkansas labor force during the study period.

3.2. Arizona Study

Ashton and Huff (1982) study the economic impact of both out-of-pocket expenditures by students and education expenditures by three Arizona universities for 1981-82. The direct and total impact of expenditures resulting from spending by students and the universities are examined as part of the study.

During the study period, the three Arizona universities considered in this study had an FTE enrollment of 51,062 resident and 15,596 nonresident students. These 66,658 students were responsible for $334.4 million in direct expenditures, exclusive of tuition and fees, in the Arizona economy. Resident students expended an average of $4,619 per full-time student, while the average for nonresidents was $6,317.[3]

The induced impact of expenditures by both resident and nonresident students totaled an additional $82.6 million. During the same study period, the three universities expended $254 million in education related expenditures. The induced expenditures resulting from direct education expenditures totaled an additional $185.9 million.

Taken together, direct expenditures by students and the three universities totaled $588.4 million. These direct expenditures induced an additional $268.5 million in spending in the Arizona economy, for a total overall impact of $856.9 million. This equates to 1.73 percent of gross state product during the study period.

[3] Nonresident student expenditures appear significantly higher due to the assumption that these students live off-campus and pay rent, food, and transportation costs while their resident commuter counterparts are assumed to live at home at zero cost.

With regard to jobs and taxes, the university system was responsible for approximately 4,390 direct and 1,932 induced jobs in the state of Arizona, and for $20.9 million in tax revenue to the state during 1981-82. This employment impact equates to about 0.41 percent of Arizona's 1982 labor force.

According to Ashton and Huff (1982), the cost to the state of Arizona to educate both resident and nonresident students during the study period totaled $254 million. Based on the total expenditure impact of $856.9 million, the benefit-cost ratio to the state of Arizona was 3.37.

3.3. Indiana Study

In a 1975 study of private higher education in the state of Indiana, Trubac analyzes data on university, faculty and staff, student, and visitor expenditures from 32 independent colleges and universities. The study clearly demonstrates that private colleges and universities have an economic impact rivaling that of their public counterparts.

Total expenditures of all groups represented by the 32 institutions studied were found to have a direct economic impact of $169 million during the study period. Of the $169 million direct impact, faculty and staff were responsible for 30.7 percent, the institutions themselves for 27.1 percent, students for 22.5 percent, and visitors for 19.7 percent (Trubac 1975). Accounting for indirect and induced impacts, the total impact of

these expenditures was $252 million, or about 0.53 percent of Indiana's gross state product. Also, the 9,600 people employed by these institutions were responsible for an additional 10,400 jobs across the state. The total employment impact of 20,000 jobs represents about 0.41 percent of the state's 1975 labor force.

The institution with the most significant economic impact was found to the University of Notre Dame, which accounted for 33 percent of the total impact of all the institutions. On a per-student basis, the University of Notre Dame was deemed to have an economic impact of some $6,638 per full-time student. By contrast, Calumet College was deemed to have the smallest impact at $1,354 per full-time student.

3.4. Kentucky Study

In a 1987 study of higher education in Kentucky, Breegle and Daly analyze 1985-86 data to assess the economic impact of expenditures of three groups within the state's higher education system: expenditures by the institutions and affiliated corporations or foundations; students attending these institutions; and, visitors to the institutions and affiliated corporations or foundations. The study admittedly focuses on short-term impacts, and excludes any consideration of potential investment returns from increases in the stock of human or physical capital resulting from the various activities of the institutions (Breegle and Daly 1987).

Findings of the study indicate that for Kentucky's eight public universities and 14 public community colleges, direct expenditures by the three groups under analysis totaled

$706.1 million during the study period, the total impact of which slightly equals $1.16 billion, or about 2.04 percent of state gross product. Of the total impact, the institutions themselves accounted for 74.6 percent, students for 23.4 percent, and visitors for two percent.

Regarding employment impact, the state's higher education system was directly responsible for 37,464 jobs. Also, these jobs were estimated to support an additional 24,336 jobs for a total employment impact of 61,800 jobs in the state of Kentucky. This figure corresponds to 3.63 percent of the state's labor force at that time.

Using as a basis the state's $479 million general fund initial investment, the total expenditure impact of $1.16 billion equates to a benefit-cost ratio of 2.4. Furthermore, it is estimated that 76 percent of the $1.16 billion return was the result of non-state tax funds which would have been spent elsewhere had the state's higher education system not existed.

3.5. Tennessee Board of Regents Study

In a 1998 study of higher education in Tennessee, Ukpolo and Dernburg use rates of return and benefit-cost ratios for both the individual and the state to compare returns from private and public expenditures on higher education to that of alternative investments. Using these measures, they conclude that Tennessee's investment in higher education through the Tennessee Board of Regents system is "a highly productive and safe investment" (Ukpolo and Dernburg 1998).

Regarding the rates of return to education, they estimate that real returns to the individual range from 14.5 to 19 percent and real returns to the state range from 12 to 16 percent depending upon the level of education attained by the individual. Also, comparing estimated present values of both the cost to the state to educate students and the additional sales tax revenue they generate, they conclude that sales tax revenue returned on the state's investment in higher education ranges from an average of 100 percent for females to 106 percent for males (Ukpolo and Dernburg 1998). In present value terms, the direct personal income impact of higher education for both males and females in the academic year 1993-94 is estimated to be some $4.01 billion, the total impact of which is further estimated to be $8.96 billion.[4]

Considering both the benefits and costs of higher education, Ukpolo and Dernburg also analyze benefit-cost ratios of higher education for both the individual and society. For the average male student, benefit-cost ratios range from 4.9 for those with an advanced degree to 7.8 for those with a two-year associates degree. The range for similar females extends from 5.2 to 5.9. Returns to society (including the state) are adjusted to account for multiplier effects and range from 8.5 to 13.4 for male students and 8.5 to 10.3 for females.

To assess benefit-cost ratios for the state alone, Ukpolo and Dernburg compare the present value of increased sales tax revenue generated by the student to the present value of the cost of educating him/her. Results of this analysis suggest that benefit-cost ratios for the state range from 0.95 to 1.38 for males and from 0.89 to 1.49 for females.

[4] Based on the 1992 RIMS II multiplier for the Southeastern U.S. (Ukpolo and Dernburg 1998).

3.6. University of Tennessee System Study

Murray and Mayes (1994) examine the economic impacts of the University of Tennessee (UT) system for the academic year 1992-93. Their analysis includes an examination of the impacts of in-state expenditures by the UT System itself, students, and associated visitors on income and employment in Tennessee's economy. With regard to expenditure impacts, Murray and Mayes estimate that UT System related expenditures were responsible for a direct impact of $483.6 million, and a total impact of $918.9 million in the state's economy. Student expenditures directly impacted the state economy by an amount of $55.1 million and induced another $49.5 million for a total impact of $104.6 million. Additionally, visitors accounted for some $26.5 million in direct and $50.3 in total expenditure impacts. In total, expenditures by the UT System institutions studied and their students and visitors had an impact the state's economy of over $1.074 billion, or about 0.90 percent of gross state product.

Turning to employment impacts, Murray and Mayes estimate that the UT System directly employs some 18,096 faculty and staff and 7,291 students. Additionally, UT System expenditures are estimated to support an additional 22,956 jobs in Tennessee's economy. Spending by students and visitors is estimated to support an additional 7,093 jobs. In total, university-related spending is estimated to support 55,436 jobs in the state, or about 2.16 percent of the state's labor force.

3.7. Tennessee Higher Education Commission Study

This 2000 study sponsored by the Tennessee Higher Education Commission (THEC) and conducted by the Bureau of Business and Economic Research/Center for Manpower studies at the University of Memphis examines several issues related to higher education in Tennessee. Included among those issues are trends in enrollment, fee revenues, and state appropriations to higher education, and also human capital and expenditure impacts of higher education.

With regard to trends in enrollment, fee revenues and state appropriations, the study indicates that from 1988-98, public higher education enrollment in Tennessee has increased by 25 percent. Further, from 1993-94 to 1998-99, state appropriations to higher education have increased by 17.2 percent while fee revenues have increased by 32.3 percent. These trends indicate that the state's public higher education institutions have increasingly relied on tuition hikes to cover shortfalls generated by enrollment growth that has outpaced growth in state appropriations.

Furthermore, the data analyzed in this study indicate that for Tennessee and its surrounding states, higher education completion rates parallel state appropriations to education. This suggests that Tennessee's sluggish growth in state appropriations to higher education may be costing the state in two ways: (1) fewer students are completing a college education; and, (2) more college-aged students may be leaving the state to study elsewhere (THEC 2000).

Concerning expenditure impacts, the study finds that over the seven-year period 1991-92 to 1997-98, direct public higher education expenditures in Tennessee amounted

to some $9.75 billion. Using RIMS II final demand multipliers, the total impact of public higher education expenditures over the same period amounted to over $23 billion in output and $7.83 billion in earnings. This equates to an average annual economic impact of $3.3 billion, or 1.94 percent of the gross state product, and 49,000 jobs in the state.

During the same seven-year period, state appropriations to higher education totaled approximately $5.89 billion. Based on the total economic expenditure and earnings impact of approximately $30.83, this equates to a benefit-cost ratio of 5.23.

3.8. Oklahoma Study

In a 1995 study, Penn and Dauffenbach analyze the rate of return to public higher education in the state of Oklahoma. As part of this study, they also analyze the economic impact of students' increased incomes on other earnings in the state.

Based on their analysis of 1992-93 data, Penn and Dauffenbach estimate that persons with at least some educational experience in the state's colleges or universities would earn $14.5 billion more over their working lifetimes. This increase in income is further estimated to yield an increase in present value tax revenues of some $975 million. Given this increase in tax revenue and the associated cost to taxpayers of $546 million to educate these students, they estimate the annual rate of return on the state's investment in higher education to be 9.48 percent. They also estimate a benefit-cost ratio of 1.78 (Penn and Dauffenbach 1995).

In order to estimate the economic impact of these "new" earnings on other earnings in the state's economy, Penn and Dauffenbach use the University of Oklahoma's

Center for Economic and Management Research Input-Output Model. Based on this model, the earnings multiplier for Oklahoma households is 1.44. Using this multiplier, the injection of $1,000 in new earnings would yield an impact of an additional $1,440 in earnings in the state's economy. Given this fact, the $14.5 billion in increased earnings generated over the working lifetimes of Oklahoma's students would yield an additional $6.4 billion in earnings in the state economy. The total impact of these new earnings would be $20.9 billion.

3.9. Texas Study

In this impressive study, Rylander (2000) uses a combined input-output and rate-of-return approach to present both a short- and long-term analysis of the economic impact of higher education in Texas. The study presents an analysis of the impact of out-of-state funds drawn into the state as a result of higher education as well as the impact of increased earnings and productivity on the Texas economy resulting from higher education.

During fiscal 1998, the state of Texas attracted and expended $2.1 billion in annual student, research, and health care funds from out-of-state sources, the total impact of which was $6.8 billion in the state economy (Rylander 2000). Of the $6.8 billion total impact, nonresident student spending accounted for $2.3 billion, out-of-state funded research spending for $3.9 billion, and the MD Anderson Cancer Center for $605 million. This overall expenditure impact equates to about 1.05 percent of Texas' gross state product.

With regard to the impact of higher education on earnings, the study concludes that the rate of return from some college study or the earning of an associates degree from a Texas public institution is slightly less than 15 percent. Additionally, the return from earning a BA or BS degree is slightly under 11 percent; a master's or doctoral degree averages just below 12 percent; and a professional degree slightly exceeds 14 percent. Based on these rates-of-return and data on expected salaries, the FY98 present discounted value of higher education in Texas was found to be $9.2 billion.

The final issue explored by the study is the impact of higher education on productivity in the state economy. Based on the work of Black and Lynch (1996), the study uses a productivity-response function to conclude that the Texas higher education system increases manufacturing productivity by 0.19 percent and non-manufacturing productivity by 0.22 percent annually. As a result of these productivity increases, Rylander concludes that the state's economic capacity is expanded by $17.8 billion annually.

Based on total expenditure, income, and productivity impacts, Rylander (2000) concludes that every $1.00 in state appropriations to higher education in the state of Texas yields more than $5.00 in total economic benefits. Furthermore, based on FY98 state and local education appropriations of $4.562 billion, benefit-cost ratios for total expenditure and income impacts are 1.49 and 3.80 respectively.

3.10. Summary of State Studies

State-level studies of higher education also demonstrate that higher education has a powerful economic impact on a variety of levels. Table 2-03 summarizes the economic impact(s) identified by the state-level studies in this section.

Table 2-03 Summary of State Studies

Study:	Type of Impact:	Amount of Impact[1] Direct:	Total:	Percent of Annual:[2]
Arkansas Study (1985)	Income	$ 140.2	$ 404.1	
	Tax Revenue		$ 4.5	
	Expenditure	$ 396.6	$ 940.0	3.22%
	Employment	8,843	36,831	3.47
Arizona Study (1982)	Tax Revenue		$ 20.9	
	Expenditure	$ 588.4	$ 856.9	1.73
	Employment	4,390	6,322	0.41
Indiana Study (1975)	Expenditure	$ 169.0	$ 252.0	0.53
	Employment	9,600	10,400	0.41
Kentucky Study (1987)	Expenditure	$ 706.1	$ 1,160.0	2.04
	Employment	37,464	61,800	3.63
TBR Study (1998)	Income	$ 4,014.6	$ 8,960.0	
UT Study (1994)	Expenditure	$ 565.2	$ 1,074.0	0.90
	Employment	25,387	55,436	2.16
THEC Study (2000)	Expenditure	$ 9,750.0	$23,000.0	1.94
Oklahoma Study (1995)	Income	$14,500.0	$20,900.0	
	Tax Revenue		$ 975.0	
Texas Study (2000)	Expenditure	$ 2,100.0	$ 6,800.0	1.04

[1] Dollar figures are in millions. Employment figures are actual.
[2] Expenditure impacts are expressed as a percent of study period's Gross State Product. Employment impacts are expressed as a percent of study period's total labor force.
[3] The THEC study covers the period 1991-92 through 1997-98. During that period the total expenditure impact was over $23 billion, which equates to an average annual impact of $3.3 billion.

To allow for a more accurate comparison of the findings of the state-level studies discussed in this section, Table 2-03 also expresses the total expenditure impact as a percent of the state's gross state product for the study period and employment impact as a percent of the state's total labor force for the study period. For the sake of consistency, similar comparisons for income and tax revenue impacts are excluded because they represent the present value of future dollars over many periods, and thus cannot be compared to values from single time period.

4. The Economic Impact of Nonresident Students

As many states are struggling to find ways to adequately fund the budgets of their public higher education systems, increasing attention is being given to the issue of nonresident students – and not all of the attention is positive (Frost, Hearn, and Marine 1997).

In a 1995 study of state finance, Gold indicates that in recent years spending on higher education has been the hardest hit area as states have engaged in fiscal belt-tightening. As a result, many states have begun to deal with mounting fiscal pressures by attempting to curtail the enrollment of nonresident students.

Policies setting higher tuition limits for nonresident students and/or directly limiting the enrollment of nonresident students have been around for quite some time. However, mounting fiscal pressures have led many states to further raise nonresident tuition rates or enact limits where they did not previously exist. As an example of such policies, in 1988 the Board of Governors of North Carolina limited the enrollment of

nonresident freshmen in each of its institutions to 18 percent annually. Later, the North Carolina House of Representatives raised nonresident tuition by 25 percent in 1991 and again by 15 percent in 1992 (Frost, Hearn, and Marine 1997).

Further bolstering the impact of fiscal pressures is a tide of social sentiment that holds that a state's primary responsibility is the education of its own residents. Some citizens and policymakers argue that classrooms filled by nonresident students are denying qualified resident students their rightful places. On the opposite side of the fence, others argue that the exclusion of nonresident students will lead to a culturally less enriching education for all.

On one side of the issue, nonresident students are viewed as an economic burden. After all, some say, why should the residents of a state carry the extra tax burden of educating nonresident students who will likely return to their home state after completing their studies? To those on this side of the issue, paying to educate nonresident students amounts to a costly subsidy to the states from which they come.

On the opposite side of the issue, critics point out the supposed hypocrisy of spending millions of dollars to attract tourists, while at the same time raising nonresident tuition to the point that students are discouraged from attending the state's universities. Summarizing this point of view, Smith and Bissonnette (1989) point out that nonresident students have a number of positive similarities to tourists. Speaking in regards to the view of nonresident students as tourists, they state, "They come from out-of-state, spend large sums of money, and best of all, they spend not one or two weeks or several weekends, but a full nine or more months contributing to the state's economy." Also,

they note that numerous visitors, namely parent and friends, come into the state as a direct result of nonresident students. Additionally, after completing their education, some students will remain in the state to work and thereby further contribute to the state's economy.

Several studies, either directly or as a portion of a larger study, examine the economic impact of nonresident students. Findings of these studies indicate that the economic benefits of nonresident students are quite significant, and often exceed the impact of their resident counterparts. This section examines several of those studies.

4.1. West Virginia Study

Smith and Bissonnette (1989) directly examine the impact of nonresident students on the economy of West Virginia. The study covers the period 1985-86.

The study analyzes the economic impact of three areas of expenditure associated with nonresident students: tuition and fees, living expenses, and expenditures by visitors. Findings of the study indicate that the 10,091 FTE nonresident students and their visitors directly expended slightly less than $72.2 million in 1985-86, the total impact of which was deemed to be some $86.6 million. By contrast, state expenditures attributed to the education of these students totaled $28.6 million.

Using figures of $86.6 million for total economic benefit and $28.6 million for total economic cost, Smith and Bissonnette calculate a benefit to cost ratio of approximately 3.02. Based on this ratio, they conclude that every dollar the state invests

in nonresident students brings a realized return of $3.02 in economic benefit over one, 10-month academic year.

4.2. Arizona Study

As part of a larger study of the impact of spending by students in Arizona universities, Ashton and Huff (1982) provide a detailed examination of the spending of nonresident students. Their analysis highlights many of the positive impacts associated with nonresident students.

In the 1981-82 academic year, Arizona's nonresident students and their associated visitors expended an estimated $98.5 million in the state's economy, the total impact of which was estimated to be $122.9 million. On an FTE basis, this equates to a $6,317 direct per-student impact and a $7,877 total impact. By contrast, the direct impact of a similar resident student was a significantly lower $4,619 per-student.[5]

The impact of nonresident students on state tax collections was found to be substantial as well. Additional state tax collections resulting from the direct and induced expenditures attributed to nonresident students was estimated at $2.9 million, or $187 per FTE student on average. Also, university related expenditures attributed to the education of nonresident students generated an additional $166 per FTE in state tax collections.

Ashton and Huff estimate the cost to the state of Arizona of educating an FTE student was $3, 815. After adjusting for higher nonresident tuition and fees and the additional state tax collections resulting from the existence of these students, they

[5] See footnote four.

conclude that the average state subsidy to a nonresident student was $975. Furthermore, by assuming that approximately 25 percent of the costs to the state of educating students – both resident and nonresident – are fixed in the short-run, they conclude the fixed portion related to nonresident students balances out the state subsidy to them.

4.3. The University of Delaware Study

Gana (1993) uses an econometric analysis to examine the economic impact of the University of Delaware (UD). As part of this study, the economic impact of nonresident students is explored.

During the 1991-92 academic year, UD had an enrollment of 9,633 resident and 11,235 nonresident students. The total economic impact, including both direct and induced impacts, of spending by all UD students is observed to be just over $27 million. Of that amount, $18 million, or approximately 67 percent, of the total impact is attributed to nonresident students.

Using Gana's data and results, it is possible to break down the economic impact of resident and nonresident students on a per-student basis. Such an analysis indicates that nonresident students had an average per-student impact of $1,602. This figure is almost two times the $934 impact of their resident counterparts. Furthermore, the cost per-student to UD to educate these 20,868 students was $1,389, a figure also exceeded by the average non-resident student's economic impact.

4.4. The University of Massachusetts/Boston Study

Again as part of a larger study, Bluestone (1993) highlights findings related to the export base of nonresident students. Specifically, he examines the income and tax revenue generated by nonresident tuition and fees and living expenses, gifts and unrestricted funds from out-of-state sources, student federal grants-in-aid, out-of-state funded grants and contracts, and federal endowment income (Bluestone 1993).

Out-of-state income to UMB from the five sources listed above totaled some $25.6 million during 1991-92. Of that amount approximately $9.9 million, or about 38.6 percent, were the result of nonresident student tuition and fees and living expenses. The total expenditure impact of the $25.6 million of out-of-state-funds was estimated to be $34.3 million.

It is interesting to note that total nonresident enrollment at UMB was a scant 495 students, or approximately 4.3 percent of the total student body. Using Bluestone's data, the direct economic impact of a nonresident student averages $20,093.[6] The average total impact slightly exceeds $26,700.[7] Given the state's average cost of $6,056 to educate a full-time student, this equates to a benefit cost ratio of 4.4.

[6] This figure includes average nonresident tuition and fees of $9,766 and estimated average living expenses of $10,327.

[7] Nonresident student spending accounts for 38.6 percent of the $25.6 million direct expenditure impact. Applying this percentage to the $34.3 million total impact yields a figure of $13,239,800, or an average of $26,747 per nonresident student.

4.5. Texas Study

Rylander (2000) investigates as part of a larger study the impact of nonresident students on the economy of Texas. During FY 1998, some 50,006 out-of-state and international students directly expended an estimated $773 million in tuition and fees, room and board, and personal expenses in the Texas economy.

Using Type II final demand multipliers[8] from a 1986 Texas Comptroller's input-output study[9], Rylander concludes that the total impact on the state's economy of direct expenditures by these students was approximately $2.3 billion. Given this estimate, the average nonresident student's total impact equates to some $45,994. Additionally, considering the state's average cost to educate a student of $8,771 along with the average impact of $45,994, the benefit-cost ratio for nonresident students is 5.24.

4.6. Summary of Nonresident Student Studies

While many citizens and policymakers alike continue to view the education of nonresident students as an economic burden, the literature demonstrates that just the opposite is true. In fact, as Table 2-05 shows, nonresident students have a substantially

[8] Type II multipliers include both industry output and household expenditures resulting from increased demand for a region's goods and services from outside sources (Rylander 2000).
[9] Texas Comptroller of Public Accounts, ***Texas Input-Output Study, 1986 Update***, Austin, TX: 1989.

Table 2-04 Summary of Average Total Impacts and Benefit-Cost Ratios for Nonresident Student Studies

Study:	Average Total Impact:	Benefit-Cost Ratio
West Virginia Study (1989)	$ 8,581	3.02
Arizona Study (1985)	7,877	2.06
University of Delaware Study (1993)[1]	1,602	1.15
UMB/Boston Study (1993)	26,700	4.40
Texas Study (2000)	45,994	5.24

[1]Includes induced impacts only.

positive impact over and above the state's cost to educate them. Also, the expenditure impacts identified by these studies do not account for the fact that some nonresident students will remain in-state to work upon completing their education and thereby continue to positively impact the state's economy with their incomes and expenditures.

5. The Economic Impact of University Research

The economic impact of university research is significant on at least two fronts. First, expenditures related to a university's research activities have a significant short-term economic impact on its local and state economy. Second, university research has a powerful longer-term impact on the productivity of workers, and ultimately leads to increased levels of both output and employment in the state's economy (Martin and Trudeau 1998).

Research activity by the nation's colleges and universities is funded by a variety of sources. The federal government, state governments, corporations, and private

individuals and foundations fund a host of research activities annually through the nation's colleges and universities. A study by Irvine, Martin, and Isard (1990) notes that in recent years, the portion of U.S. higher education research funded by outside entities has grown more rapidly than the portion funded with general university funds. Clearly, an institution with a strong research program can serve as a base for attracting funds from a variety of sources. The expending of these funds provides benefits to the local economy, some of which might not have otherwise been realized.

As the positive economic impacts of university research expenditures have been recognized, an increasing number of studies have explored the extent of that impact. This section summarizes a few of those studies.

5.1. Canada Study

Martin and Trudeau (1998) explore the economic impact of university research in Canada. Findings indicate that both the short-term expenditure impact and the longer-term productivity and employment impacts of university research can be quite substantial.

Martin and Trudeau estimate that total Canadian university research expenditures amount to approximately $4.8 billion annually. To add perspective, they note that this figure exceeds the annual research expenditures of the nation's 15 top private sector corporations. Furthermore, using an input-output approach, they conclude that the $4.8 billion in research expenditures sustains approximately $5 billion (or one percent) of Canada's 1994-95 GDP.

The impact of university research expenditures on employment is found to be substantial as well, accounting for some 81,000 full-time jobs. This figure equates to 0.5 percent of all Canadian jobs.

With regard to the longer-term impact of increased factor productivity, they estimate the total impact of university research to be $15.5 billion annually. This figure corresponds to the support of approximately 150,000 to 200,000 jobs.

5.2. Texas Study

In 1997-98, Texas higher education institutions directly expended $1.8 billion on research and related expenditures. Of the total amount, $881 million was funded by the federal government; $326 million by state government; $295 million by private corporations; and $124 million by the institutions themselves (Rylander 2000). The total economic impact of university research on the Texas economy was an estimated $3.9 billion.

5.3. NASULGC Study

A 1997 survey by the National Association of State Universities and Land-Grant Colleges highlights the economic significance of research expenditures at several southeastern colleges and universities. Some of the findings of that survey include that:

- In 1993-94, research activities at Auburn University were responsible for $168 million in productivity support in Alabama.

- In 1993-94, the University of Florida was awarded $193 million for sponsored research, the majority of which came from outside the state of Florida.
- In 1995-96, externally funded research at the University of Kentucky was responsible for approximately 3,000 jobs.

6. Summary of Literature Review

While studies aimed at estimating the economic impact of colleges and universities have utilized a variety of methods and approaches, their results have been unified around one central theme – that a college or university can serve as a powerful economic stimulus in its surrounding locale and broader state economy. Whether analyzing the expenditure impact of the institution and its associated groups, the tax impact of students' increased levels of income, rates-of-return to the individual or state, or the institution's impact on productivity and economic growth, quantification of such impacts shows that a college or university's impact is substantially positive.

The Caffrey-Isaacs model (Caffrey and Isaacs 1971) serves either methodologically or ideologically as the backbone of a preponderance of economic impact studies of higher education. Indeed, it was the introduction of the Caffrey-Isaacs model that served as the beginning point of an explosion of economic impact studies of higher education (El-Khawas 1985). While studies may differ in the way(s) data are analyzed, the data themselves are largely constructed and/or obtained in ways suggested by their approach.

In more recent years, however, greater attention has been given to impacts ignored by the Caffrey-Isaacs approach. The Caffrey-Isaacs model is intended to measure short-term impacts, but institutions of higher education offer many positive long-term benefits as well. By enhancing productivity and economic growth, increasing future tax collections, and serving as a powerful research engine, the nation's colleges and universities provide measurable economic benefits both today and in the future.

Increasing attention has also been given to the college or university's role as an export base for attracting non-local and out-of-state funds. By attracting nonresident students and their associated visitors, federal student aid, and out-of-state funded research grants and contracts, a college or university brings into the community and expends dollars that would not have otherwise been realized. Local and state residents benefit from these funds in a way much akin to that of tourism dollars, but the impact of the dollars flowing through the college or university is much more long lasting.

As more citizens and policy makers have begun to realize the many positive economic benefits stemming from the existence of institutions of higher education, a slow change in view seems to be taking place. Rather than viewing higher education as a loss-leader or necessary evil, many have begun to view it as an investment. As Table 2-06 demonstrates, benefit-cost ratios from several of the studies discussed in this chapter give evidence of the positive tradeoffs between the costs of higher education to the state and its associated benefits, and show that this new view is not without merit.

Table 2-05 Summary of Benefit-Cost Ratios from Selected Institution and State Studies

Study:	Type of Impact:	Benefit-Cost Ratio
Arizona Study (1985)	Expenditure	3.37
Kentucky Study (1987)	Expenditure	2.40
TBR Study (1998)	Income	0.89-1.49[1]
THEC Study (2000)	Expenditure	5.23
Oklahoma Study (1995)	Income	1.78
Texas Study (2000)	Income Expenditure	3.80 1.49
West Virginia Study (1989)	Expenditure	3.02
UMB/Boston Study (1993)	Income	1.57
NCATSU Study (1995)	Income	5.26

[1]Depending upon sex and degree attained.

This change in view, however, has not yet been pervasive enough to quash the flames of controversy arising from increasingly heated debates over higher education funding. Nevertheless, the fact remains that institutions of higher education, however costly they may be, also bring a host of positive benefits. Like any other worthwhile project or activity, however, an accurate assessment of a college or university's many benefits must be made in order to justify its substantial cost.

CHAPTER 3

RESEARCH METHODOLOGY

This chapter presents a discussion of the research methodology, economic impact model and data used to analyze the direct and total economic impacts of nonresident student and Federally funded research expenditures at 11 selected public higher education institutions in Tennessee. The chapter is organized into three sections.

Section 1 discusses the research methodology utilized by this study. It includes a discussion of the input-output modeling approach to economic impact analysis and its limitations. It also discusses the calculation and interpretation of benefit-cost ratios.

Section 2 discusses the specific economic impact model used to conduct this analysis. A description of the different types of impacts identified by this model and study is also presented.

Section 3 presents a discussion of the data used in this study. Data sources are identified, and relevant assumptions pertaining to the data are outlined.

1. Research Methodology

As Chapter 2 of this study has demonstrated, studies intended to measure the economic impact of institutions of higher education have utilized a variety of measures and ideological approaches. But, this diverse literature shares a high degree of commonality on at least two key fronts.

First, the literature overwhelmingly shows that an institution of higher education can have a substantial and wide-ranging economic impact on its region and state. Whether analyzing expenditure, income and future tax revenue, rate-of-return, or productivity impacts, a host of studies show that higher education packs a powerful economic punch.

Second, the literature indicates that although economic impact studies of higher education have been guided by a variety of motivations and ideologies, there has been a general consensus regarding the methodology for estimating economic impacts. The principles of input-output analysis serve as the methodological basis for the estimation of economic impacts in a vast majority of such studies.

1.1. The Input-Output Methodology

The 1971 introduction of the Caffrey-Isaacs model represented the establishment of the first methodological benchmark for conducting economic impact studies of higher education. Indeed, the publication of this model sparked a significant increase in the number and quality of economic impact studies of this type (Elliot, Levin, and Meisel 1988).

A careful reading of Caffrey and Isaacs' (1971) manual indicates that the key contribution of their model relates more to the acquisition and analysis of data pertaining to the amount of the direct economic impact of the institution than to analyzing the impacts themselves. Only a limited amount of discussion is dedicated to the concept of

the multiplier, which links the institution's direct impact to its total impact by accounting for secondary (and later) rounds of expenditure.

The concept of the multiplier is an important element of an economic impact study of this type. In simple terms, measuring the economic expenditure impact of an institution of higher education is a four-step process:

- First, the institution under study must be clearly identified.
- Second, data must be gathered which clearly reflect the extent of the direct economic impact of the institution. *Direct* impact includes the goods and services purchased by the institution in the specified region of impact.
- Third, the extent of the institution's indirect and induced impacts through the multiplier process must be estimated. *Indirect* impacts arise from the purchases of firms selling directly to the institution. *Induced* impacts arise from the production of new goods and services designed to meet the increase in demand arising from the additional wages generated by the direct and indirect impacts.
- Fourth, the direct, indirect, and induced impacts must be summed to find the extent of the institution's *total* economic impact.

The literature indicates that while the Caffrey-Isaacs model and subsequent variations on it have made significant contributions to the second step of this process, there has been a widespread consensus on the methodology for estimating the indirect and induced impacts via the multiplier process in step three.

In its most basic sense, the Caffrey-Isaacs model is an application of input-output

modeling. According to Goldstein (1990), "A regional input-output model is designed to estimate the indirect impact of a properly and carefully specified direct or initial impact experienced in one or more industry sectors within a region." The extent of the total impact is dependent upon the multipliers accounting for the size of the indirect impact.

Modern input-output analysis traces its roots back to the work of Leontief (1936), but early attempts at this type of analysis date as far back as F. Quesnay's *Tableau Economique* of 1758. The main gist of either approach involves an attempt to identify the economic consequences of some initial impact, such as a change in final demand, on a given industry or sector and on related industries and sectors.

Nonresident students' demand for Tennessee's public higher education services can be represented by the amount of their expenditures for those services in a given academic year. Similarly, the out-of-state demand for a university's research services can be represented by annual revenue from such sources. By assuming such demands are new, input-output analysis can be used to assess the total economic impacts associated with them.

The injection of funds into the state of Tennessee resulting from direct nonresident student and out-of-state funded research expenditures generates economic activity from which residents of the state benefit. The resulting total impact of the initial injection of funds is dependent upon the value of relevant multipliers that account for second and later round output, income, and employment effects.

1.2. Limitations of Input-Output Methodology

Input-output analysis requires the application of relevant multipliers to some direct impact to assess the extent of the total impact associated with it. Because of the nature of the multipliers themselves, the results of input-output analysis are limited by factors of time and space.

According to Goldstein (1990), input-output models account only for "stimulating economic activity in businesses whose products are purchased directly or indirectly by the university or its employees and only over the short term." Additionally he notes that, "input-output analysis does not take into account economic activity stimulated by 'localization economies' whereby businesses locate in the region in order to share specialized inputs that are made possible by the university."[1]

These observations highlight the fact that institutions of higher education provide long-term economic benefits that simply cannot be captured by the short-term nature of input-output analysis and its associated multipliers. Similarly, an institution provides economic benefits extending into a broader geographic region than can be fully captured by a regional input-output model. However, even with these limitations, input-output analysis provides a reliable and accurate method for estimating the economic impact of a college or university (Goldstein 1990).

[1] See Elliot, Levin, and Meisel (1988) and Pennsylvania Economy League (1982) regarding this issue.

1.3. Benefit-Cost Ratios

Once dollar values for total economic impacts are identified it is possible, given data on associated costs, to calculate meaningful benefit-cost ratios. Such ratios are calculated by dividing the total dollar value of economic benefit by the associated total dollar cost of achieving those benefits. The resulting ratio can be interpreted as the dollar amount of benefit per each dollar of estimated cost or investment.

The value of such a ratio is in its comparability to similar ratios for other types of economic activities. Given such ratios, policymakers and educational planners can have a more accurate and consistent yardstick for comparing the relative value of different types of projects or programs.

As an example application of this approach to the expenditure impact of nonresident students, Smith and Bissonnette (1989) use estimated figures of $86.6 million in total benefit and $28.6 million in total costs to calculate a benefit-cost ratio of 3.02 for nonresident student university enrollment in West Virginia during 1982-83. They interpret this ratio as indicative of a return of $3.02 in economic benefit from every state dollar invested in nonresident student education.

Ukpolo and Dernburg (1998) use a similar approach to study benefit-cost ratios for higher education in Tennessee. Based on average present values of both increased state tax revenue over all degree levels of $16, 856 and state education costs of $16,170, they calculate a benefit-cost ratio of 1.04.

Using the calculated total economic benefit of nonresident students and the estimated short-term state costs to educate them, this study calculates benefit-cost ratios for nonresident education in Tennessee.

2. Economic Impact Model

In order to calculate the total economic impact of some initial direct impact, relevant impact multipliers are required. Such multipliers require large amounts of data to estimate, but once they are calculated they become fairly simple to apply. The value of the total impact is simply the product of the direct impact and the associated multiplier.

The literature indicates that studies of the economic impact of higher education have utilized multipliers from a variety of sources. Among the most popular sources are:

- The United States Department of Commerce, Bureau of Economic Analysis, *Regional Input-Output Modeling System, 1986* (RIMS II) multipliers;[2]
- Institutionally estimated multipliers;[3] and,
- State estimated multipliers.[4]

Because of the large amount of data required to estimate them, the calculation of multipliers can be an expensive and time-consuming proposition. In recent years, several regional input-output models have become readily available in computer software form. These models incorporate regional multipliers along with tools for analyzing and estimating regional economic impacts (Brucker, Hastings, and Latham 1987).

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[2] See Morse, Sakano, and Price (1995) and Ukpolo and Dernburg (1998) for an example.
[3] See Penn and Dauffenbach (1995) for an example.
[4] See Rylander (2000) for an example.

The economic impact analysis conducted in this study is accomplished using the IMPLANPro® economic impact assessment software system. IMPLAN is a product of the Minnesota IMPLAN Group, and combines software and data files which allow the user to create local, regional, and state input-output models. The data files include information for 528 industries and 21 economic variables at the state, county, or Zip code level.

The impacts identified in this study are based on the IMPLAN database for 1998, which is the most current database available. The IMPLANPro® software used for these estimates is housed at the Business and Economic Research Center, Middle Tennessee State University, Murfreesboro, Tennessee.

3. Data and Assumptions

The total expenditure impact estimated by an input-output model is the sum of three components: the direct or initial expenditure impact plus the additional indirect and induced economic impacts generated via the multiplier process. The extent of the direct impact under investigation must first be identified, and then the extent of the indirect impact is estimated by applying appropriate impact multipliers. As discussed in Section 2, the impact multipliers may be identified from a variety of sources.

The first – and perhaps most important – step in this process is the identification and estimation of the extent of the direct impact under analysis. The purpose of this section is to discuss the data, assumptions, and calculations used to estimate the direct expenditure impacts of nonresident students and out-of-state funded research.

3.1. Nonresident Student Data

Estimation of the direct expenditure impact of nonresident students requires an identification of the number of nonresident students enrolled at the 11 institutions under study and an estimation of their annual expenses. Annual expenses for these students include the cost of out-of-state tuition and fees, room and board, books and supplies, and transportation and miscellaneous expenses.

3.1.1. Nonresident Student Enrollments

The nonresident enrollment data used by this study were supplied by the Tennessee Higher Education Commission (THEC), and includes headcount and full-time equivalent (FTE) enrollment data for 2000-01. The data include the number of students classified as "out-of-state" for tuition purposes at each of the 11 TBR and UT institutions, and is broken down by undergraduate, graduate, and professional classifications.

In addition to those students classified as out-of-state for tuition purposes, a separate category exists for the Academic Common Market (ACM). The ACM is a program which allows students from 11 states (including Tennessee) to enroll in unique academic programs without paying out-of-state tuition. At least one purpose of the program is to eliminate unnecessary and expensive duplication of specialized programs. ACM students are nonresidents, however they pay tuition and fees at state resident rates. During 2000-01, some 1,027 nonresident students studied in Tennessee under the ACM.

Another source of nonresident students that study in Tennessee but do not pay out-of-state tuition comes under the Special Act County arrangement at Austin Peay

State University. According to the Tennessee Board of Regents *Regulations for Classifying Students In-State or Out-of-State for the Purpose of Paying Fees and Tuition*,[5] "A person whose domicile is in a county of another state lying immediately adjacent to Montgomery County, or whose place of residence is within 30 miles of APSU shall be classified as out-of-state, but shall not be required to pay out-of-state tuition..." During 2000-01, some 439 undergraduate and 36 graduate nonresident students from three Kentucky counties and Fort Campbell studied at APSU under this special arrangement.

Studies addressing the economic impact of higher education have typically focused on FTE enrollment for purposes of estimating student expenditure impacts. One undergraduate FTE is defined as 15 credit hours and one graduate FTE as 12 credit hours. Total, per-semester undergraduate and graduate credit hours are divided by these numbers to arrive at FTE enrollments. This calculation allows for a more accurate inclusion and analysis of part-time student impacts.

Table 3-01 shows nonresident FTE undergraduate and graduate enrollments (including the ACM) in Tennessee for 2000-01. This table indicates that 2000-01 nonresident FTE enrollment included approximately 9,399 undergraduates, 3,504 graduate and professional students, and 1,027 ACM students. The total nonresident FTE enrollment for this period is approximately 13,930 students.

[5] This document is available from the Tennessee Board of Regents or any TBR institution.

Table 3-01 Nonresident FTE Enrollments, 2000-01.

Institution or Program	Nonresident Undergraduate FTE's	Nonresident Graduate FTE's	Academic Common Mkt.[1]	Total Nonresident FTE's
APSU[2]	457.33	54.17	0	511.50
ETSU	671.13	257.17	153	1,081.30
ETSU MED	0.00	23.00	0	23.00
MTSU	807.07	60.17	521	1,388.24
TSU	2,601.13	60.50	0	2,661.63
TTU	254.60	28.00	6	288.60
UM	872.77	897.00	106	1,875.77
UM LAW	0.00	35.50	0	35.50
UTC	429.93	154.67	5	589.60
UTK	2,936.27	1,359.75	236	4,532.02
UT LAW	0.00	85.83	0	85.83
UT VETMED	0.00	17.92	0	17.92
UTM	368.60	24.92	0	393.52
UTSI	0.00	60.25	0	60.25
UTHS – PROF	0.00	188.00	0	188.00
UTHS – OTHER	0.00	197.00	0	197.00
Totals	9,398.83	3,503.85	1,027	13,929.68

[1] Academic Common Market enrollments are headcount numbers; however, a comparison of nonresident undergraduate headcount and FTE's across all institutions shows that FTE's average 99.8% of headcount enrollment, so the two are in essence identical.
[2] APSU enrollments include Special Act counties.
Sources: Tennessee Higher Education Commission (THEC) and individual institutions.

3.1.2. Nonresident Student Expenditures

This study analyzes four categories of direct expenditures made by nonresident students during the 2000-01 academic year. Those categories include expenditures for:

- Out-of-state tuition and fees;
- Room and board;
- Books and supplies; and,
- Transportation and miscellaneous expenses.

Nonresident student expenditure estimates were obtained through the National Center for Education Statistics, Integrated Post-Secondary Education Data Source (IPEDS) College Opportunities On-line (COOL) database. This database includes a variety of institution-level information on institutional characteristics, enrollments, annual student expenses, and financial aid.

The information included in this database is obtained by the NCES through annual surveys of each institution. To verify the accuracy of these data, the information on annual expenses was crosschecked against a sampling of the 11 institutions' annual ***Factbooks*** and also against THEC data. This comparison indicated that the IPEDS data are indeed highly accurate.

3.2. Nonresident Student Expenditure Data Assumptions

Because of limitations on available data, two key assumptions are made in the analysis of nonresident student expenditures. Those assumptions pertain to expenditures on tuition and fees and room and board.

3.2.1. Out-of-State Tuition and Fees

Each year, many students whose families live outside of Tennessee choose to pursue their education at one of the state's public universities. State policy calls for such students to pay a higher level of tuition because their families are not taxpayers in Tennessee, and thus do not provide tax revenue dedicated to higher education funding.

However, various provisions, such as scholarships and assistantships, allow qualified students to receive either reduced tuition rates or a total waiver of out-of-state tuition.

As a result of these various provisions, not all out-of-state students pay full out-of-state tuition rates. Unfortunately, there are no data or mechanism for obtaining data which detail the extent or amount of out-of-state tuition and fee waivers received by nonresident students at the 11 institutions under study. Because of this limitation, there is no way to accurately adjust nonresident expenditures on tuition and fees downward to reflect the actual amount of out-of-state tuition and fee waivers.

This particular data problem, however, is not unique to this study. Indeed, several studies examining the impact of nonresident students have faced similar data limitations.[6]

As a result of this data limitation, the literature shows that estimates for nonresident student expenditures on tuition and fees are typically calculated by multiplying the appropriate FTE nonresident enrollment numbers by the annual out-of-state tuition and fee cost at each institution. Because of its standard acceptance in the literature, this approach that also be utilized by this study. Therefore, it will be assumed that all out-of-state students pay the full out-of-state tuition rate, and annual expenditures on tuition and fees will be estimated accordingly.

It is important to note that this approach will clearly result is some overstatement of nonresident student expenditures on tuition and fees; however, no alternative method exists that will yield a more accurate estimate. In an attempt to account for the extent of any overstatement, a sensitivity analysis reflecting various reductions in this category of

[6] See Ashton and Huff (1982); Smith and Bissonette (1989); Bluestone (1993); and, Rylander (2000).

expenditure will be performed on the results of the economic impact analysis. The results of this analysis will be included in Chapter 4.

3.2.2. Room and Board Expenses

While data exist for each institution detailing the total numbers of students living on- versus off-campus, there are no data that details such numbers specifically for nonresident students. Therefore, there exists no data that could serve as a basis for estimating annual on- versus off-campus room and board expenditures for nonresident students.

Because of this limitation, it will be assumed that all nonresident students live in on-campus housing and purchase a university meal plan. Thus, nonresident student expenditures for room and board will be estimated by multiplying the appropriate FTE nonresident enrollment by the NCES estimate for annual room and board cost at each institution.

NCES data indicate that estimates for on- versus off-campus room and board expenses are indeed quite close, with on-campus expenses being lower in most cases. Considering this fact, on-campus room and board should serve as a somewhat understated estimate of annual nonresident expenditures.

Given the data assumptions, Tables 3-02, 3-03, and 3-04 detail estimates for nonresident student direct expenditures at each institution for 2000-01. Table 3-02 details information related to nonresident undergraduate direct expenses, whereas Table 3-03 provides similar information for nonresident graduate and professional students.

Table 3-02 Nonresident Undergraduate Student Direct Expenditures and FTE's, 2000-01

Institution	Tuition & Fees	Room & Board	Books & Supplies	Transportation & Miscellaneous	Nonresident FTE's[1]	Total Direct Expenditures
APSU[2]	$ 8,441	$3,470	$1,000	$1,520	620.33	$ 6,481,290
ETSU	8,387	3,818	830	5,323	824.13	14,268,295
MTSU	8,419	4,080	800	2,942	1,328.07	18,636,997
TSU	8,279	3,710	700	2,500	2,601.13	39,508,564
TTU	8,295	4,293	700	1,540	260.60	3,830,409
UM	8,873	5,300	700	3,080	978.77	16,958,542
UTC	8,514	4,547	600	2,362	434.93	6,940,483
UTK	10,216	4,570	998	4,310	3,172.27	62,126,049
UTM	8,510	3,780	900	2,400	368.60	5,746,474
Grand Total						$174,497,103

[1] Nonresident FTE enrollments also include the Academic Common Market.
[2] APSU nonresident FTE enrollment also includes Special Act (Kentucky) Counties. These students are nonresidents, but pay the in-state tuition rate of $2,813.
Sources: NCES/IPEDS "College Opportunities On-Line" database and the Tennessee Higher Education Commission (THEC).

Table 3-03 Nonresident Graduate and Professional Student Direct Expenditures and FTE's, 2000-01

Institution	Tuition & Fees	Room & Board	Books & Supplies	Transportation & Miscellaneous	Nonresident FTE's	Total Direct Expenditures
APSU[1]	$ 9,443	$3,470	$1,000	$1,520	54.17	$ 633,398
ETSU	9,389	3,818	830	5,323	257.17	4,978,811
ETSU MED	23,725	3,905	1,788	5,323	23.00	799,043
MTSU	9,421	4,080	800	2,942	60.17	1,037,511
TSU	9,281	3,710	700	2,500	60.50	979,556
TTU	9,297	4,293	700	1,540	28.00	443,240
UM	9,755	5,300	700	3,080	897.00	16,894,995
UM LAW	14,997	5,300	1,172	3,080	35.50	871,490
UTC	8,960	4,547	600	2,362	154.67	2,547,260
UTK	10,346	4,470	998	4,310	1,359.75	27,499,584
UTK LAW	15,722	5,666	1,172	4,310	85.83	2,306,252
UTK VETMED	18,854	5,666	2,186	4,310	17.92	555,807
UTM	8,956	3,780	900	2,400	24.92	399,617
UTSI	9,946	1,550	500	4,310	60.25	982,437
UTHS – PROF[2]	19,296	5,890	3,786	5,368	188.00	6,455,920
UTHS – OTHER	10,381	5,890	3,786	5,368	197.00	5,008,725
Grand Total						$72,393,645

[1] APSU nonresident FTE enrollment also includes Special Act (Kentucky) Counties. These students are nonresidents, but pay the in-state tuition rate of $3,815.
[2] UTHS – PROF includes an average of expenditures for the four largest professional programs (medicine, pharmacy, dentistry, and nursing). UTHS – OTHER includes and average of costs for programs other than the four professional programs. Available nonresident enrollment data reflects a similar breakdown.
Sources: NCES/IPEDS "College Opportunities On-Line" database and the Tennessee Higher Education Commission (THEC).

Table 3-04 combines the grand totals from Tables 3-02 and 3-03 to show the total direct impact of nonresident student expenditures in Tennessee for 2000-01. As Table 3-04

Table 3-04 Total Nonresident Student Direct Expenditures, 2000-01

Undergraduate Direct Expenditures	Graduate and Professional Direct Expenditures	Total Direct Expenditures
$174,497,103	$72,393,646	$246,890,749

indicates, nonresident student expenditures during this period totaled an impressive $246.89 million.

3.3. Out-of-State Funded Research Expenditures

In addition to providing educational services to students, the 11 universities under study provide a host of other important services to various groups each year. In the course of their work they also provide a broad spectrum of local research, educational, and public service activities designed to benefit citizens and businesses located within their respective communities. Additionally, they provide a host of research, development, and contract services to interested parties from across the nation.

Many businesses and not-for-profit organizations, as well as local, state, and the Federal government, provide research funding to explore a variety of issues and ideas and contract with the university or its faculty for specialized services. This process is a natural use of the specialized pool of talent embodied in a university's faculty and the unique research resources available to them.

As these research and contract dollars flow into the university, they also flow out from it through salaries and expenditures generated by the activity they fund. As discussed in Chapter 2, research-related expenditures can also have a powerful economic impact on the university's local and regional economy.

Like nonresident students, out-of-state funded research activity represents an annual inflow of non-state dollars from which the state of Tennessee benefits. The total magnitude of this benefit depends on the amount of direct expenditures generated by out-of-state funded research and the indirect and induced expenditures they further generate through the multiplier process.

The most significant source of non-Tennessee funding for this type of activity comes from the Federal government. Each year, the 11 institutions under study receive significant revenue from the Federal government in the form of grants and contracts.

Federal grants provide dollars for research, educational, and public service activities related to a wide variety of issues and topics. Additionally, on an annual basis the institutions themselves or individual faculty and staff members provide services under contractual agreement with the Federal government.

The most recently available audited data from the Tennessee Comptroller's Office is for the 1999-00 academic year. As Table 3-05 shows, during that period the 11 institutions under study received over $227.83 million in Federal grant and contract revenue. This figure alone is roughly five times larger than similar revenues from other non-Tennessee state and private sources.

Table 3-05 Federal Grant and Contract Revenue by Institution, 1999-00

Institution	Federal Grant and Contract Revenue
APSU	$ 6,451,404
ETSU	19,641,117
MTSU	10,510,579
TSU	29,940,033
TTU	5,929,515
UM	26,263,847
ALL UT	129,096,396
Total	$227,832,891

Source: Tennessee Comptroller's Office audited financial statements for FY 2000.

CHAPTER 4

RESULTS OF ECONOMIC IMPACT ANALYSIS

This chapter presents the findings of the economic impact analyses conducted by this study. The chapter is organized into three sections.

Section 1 discusses the economic impact on the state's economy of nonresident student expenditures at the 11 Tennessee public higher education institutions under study. Specifically, findings on output, income, and employment impacts are presented. This section also presents a discussion of short-term cost-versus-benefit considerations for nonresident students based upon estimated economic benefits and associated state subsidies for public higher education in Tennessee.

Section 2 presents the results of a sensitivity analysis intended to account for a lack of data on the extent of out-of-state tuition and fee waivers given to nonresident graduate students receiving assistantships. This analysis presents a range of estimated impacts based on various levels of downward adjustment to nonresident graduate tuition and fee expenditures arising from assumptions regarding the number of nonresident graduate students on assistantships.

Section 3 discusses the economic output, income, and employment impacts of expenditures arising from Federal grant and contract dollars received by the 11 institutions under study.

1. Nonresident Student Impact and Benefit-Cost Considerations

This section presents the findings of the economic impact analysis of nonresident student expenditures at 11 Tennessee public higher education institutions. The findings include estimates for output and employment impacts at the statewide level for the 2000-01 study period. Additionally, based on the estimated economic impact and data on state subsides to public higher education, the identified economic benefits are considered in view of a portion of the state's short-term cost of higher education.

The economic impacts discussed in this chapter were estimated using the IMPLANPro® economic impact modeling software. The particular software used for this analysis is housed at the Business and Economic Research Center at Middle Tennessee State University, Murfeesboro, Tennessee.

1.1. Economic Impact

As detailed in Chapter 3, nonresident student expenditures at the 11 institutions under study directly impacted Tennessee's economy by some $246.89 million during the 2000-01 academic year.[1] Based on the estimated level of direct impact, Table 4-01 provides estimates for the associated expenditure (output) impact.

As Table 4-01 indicates, nonresident student expenditures impacted Tennessee's output level by a total of $412.3 million during the study period. This level of additional

[1] This amount does not include the direct impact of nonresident students attending during the summer.

output was further estimated to support some 5,563 direct and 2,056 indirect and induced jobs across the state, for a total employment impact of 7,619 jobs.[2]

Table 4-01 Nonresident Student Economic Impact, 2000-01

Type of Impact	Direct Impact	Multiplier Impact[1]	Total Impact
Expenditure (Output)	$246,890,747	$165,389,846	$412,280,593

[1] Multiplier impact includes the total of *indirect* and *induced* impacts.
Note: Dollar figures are in 2001 dollars.

To further explore the nature of the economic impact of nonresident students, the direct impacts were segregated by four-year institutions and specialized institutions according to the THEC appropriation scheme.[3] This analysis is reasonable on the basis that out-of-state tuition rates at the state's specialized institutions are significantly higher on an absolute and percentage basis than the rates at four-year institutions. Furthermore, the per-student state appropriations to these institutions are also significantly higher. The results of the analysis on these two segregated categories are presented in Tables 4-02 and 4-03.

Table 4-02 Nonresident Student Economic Impact at Four-Year Institutions, 2000-01

Type of Impact	Direct Impact	Multiplier Impact[1]	Total Impact
Expenditure (Output)	$233,088,820	$156,581,165	$389,669,985

[1] Multiplier impact includes the total of *indirect* and *induced* impacts.
Note: Dollar figures are in 2001 dollars.

[2] Most of the direct employment impact (5,068 jobs) was attributed to the university sector, but it would be difficult to measure the number of university jobs accounted for solely by nonresident students.
[3] The specialized units include the ETSU College of Medicine, the UT Health Sciences Center and the UT College of Medicine, the UT Veterinary Medicine program, and the UT Space Institute. Nonresident FTE enrollment at these institutions totaled 486.17 students during the study period.

Table 4-03 Nonresident Student Economic Impact at Specialized Institutions, 2000-01

Type of Impact	Direct Impact	Multiplier Impact[1]	Total Impact
Expenditure (Output)	$13,801,927	$8,808,696	$22,610,623

[1] Multiplier impact includes the total of *indirect* and *induced* impacts.
Note: Dollar figures are in 2001 dollars.

Based on the findings of the segregated analysis, nonresident students at the four-year institutions accounted for approximately $389.6 million or 94 percent of the total nonresident student economic impact of $412.3 million. Nonresidents at the specialized institutions accounted for approximately $22.6 million, or the remaining six percent of total impact.

Total nonresident FTE enrollment at the 11 institutions totaled approximately 13,930 students during 2000-01, with 13,444 students at the four-year and 486 at the specialized institutions. On a per-student basis, the average impact of students at the four-year universities equates to some $28,985, while the average impact of a student at a specialized institution is approximately $46,524. The difference between the two averages is likely accounted for by the impact of the higher out-of-state tuition rates at the specialized institutions.

1.2. Benefit-Cost Considerations

It is inherently difficult to analyze the true value of any benefit without considering the associated cost of achieving or realizing it. Like many projects involving the expenditure of state funds, an accurate assessment of the cost to the state and its

citizens of providing higher education must include the opportunity cost associated with alternative uses of those funds.

Both annually and over time, a state's citizens and policymakers must choose between competing uses of the state's tax revenues. Economists would suggest that a prudent approach to this process would incorporate some consideration of the potential benefits associated with each potential use of funds. Since all states choose to provide higher education services to their citizens and others, one must conclude that – at least on average – the realized benefits from state funds spent on higher education are perceived to exceed the opportunity cost of those funds.

A state's public higher education system is funded in large part with tax dollars received from citizens and businesses engaged in economic activity or who own property within the state. Students who come from other states and countries to study in Tennessee receive a benefit for which citizens of Tennessee have paid. Hence, Tennessee (and most other states) charge higher tuition rates to out-of-state students in an attempt to recoup all or part of the tax dollars going into educating them.

As has been demonstrated by this study and others, nonresident students also bring positive economic benefits to the state via their spending. When viewing nonresident student enrollment as the filling of excess capacity, it is relevant to recognize that their spending embodies a benefit that the state may not have otherwise realized. This benefit is realized while they are in school here, and perhaps longer and more significantly if they choose to stay in the state to work following completion of their studies.

The calculation of an appropriate cost measure for nonresident student education is a difficult undertaking. According to the literature, the preferred method of estimating such costs when benefit-cost ratios are to be calculated involves the use of per-student state subsidies to higher education. The total cost to the state of educating nonresident students during the study period equates to nonresident FTE enrollment times the per-student state subsidy. This cost measure has been used by a variety of existing nonresident student economic impact studies, as well as those examining other issues.[4]

It is important to recognize that while this may be the preferred method in the extant literature, it captures at best only a portion of the short-term cost of higher education. This method ignores both capital cost considerations and the opportunity cost of alternative uses of state dollars appropriated for higher education, and hence underestimates the true cost of education. Benefit-cost ratios calculated via this method are likely overstated because of this underestimation of costs. Perhaps a more appropriate interpretation of such ratios would be to view them as an indication of the short-term return on a portion of the state's investment in higher education

In order to estimate a portion of the short-term cost of educating nonresident students in Tennessee, data on state subsidies for 2000-01 were obtained from THEC. Based on those data, state appropriations for higher education to the four-year and

[4] See Smith and Bissonnette (1989); Morse, Sakano, and Price (1996); Ukpolo and Dernburg (1998); and Rylander (2000) for applications of this approach.

specialized institutions totaled approximately $574.5 million and $141.5 million, respectively.[5]

During the same period, total FTE enrollment at the four-year universities was 95,996 students, and 2,734 at the specialized institutions. Using these figures, the average per-student state subsidy to the four-year and specialized institutions was $5,985 and $51,744, respectively.

Given the average per-student state subsidies and the nonresident FTE enrollments at the four-year and specialized institutions, it is possible to estimate the short-term cost to the state of educating nonresident students during the study period. The results of this calculation are shown in Table 4-04.

Table 4-04 Estimated Short-Term State Cost of Educating Nonresident Students, 2000-01

Type of Institution	Average Per-Student Subsidy	FTE Enrollment	Cost To State
Four-Year	$ 5,985	13,444	$ 80,462,340
Specialized	51,744	486	25,147,584
Total Estimated Cost			$105,609,924

Note: Subsidy and enrollment data are from THEC.

Utilizing the estimates of total economic benefit and total cost to the state of educating nonresident students, benefit-cost ratios for nonresident student education in Tennessee were calculated. Benefit-cost ratios for all nonresident students, nonresident

[5] These appropriations include the base appropriation plus additional funds for Centers of Excellence/Emphasis and fee discount and waiver programs.

four-year students, and nonresident students at specialized institutions are included in Table 4-05.

Table 4-05 Benefit Versus Appropriated Cost for Nonresident Student Education in Tennessee, 2000-01

Category	Total Estimated Benefit	Total Estimated State Cost	Benefit-Cost Ratio
All Nonresident Students	$412,280,593	$105,609,924	3.90
Nonresident Four-Year	389,669,985	80,462,340	4.84
Nonresident Specialized	22,610,623	25,147,584	0.90

As Table 4-05 indicates, the state of Tennessee realizes on-average $3.90 of benefit per every one dollar of state appropriation invested in nonresident student education. This benefit increases to $4.84 per every one dollar invested in nonresident student education when considering the four-year universities alone, and falls to $0.90 when considering just the specialized units.

During 2000-01, per-student subsidies for the specialized institutions ranged from a low of $34,877 at the UT Health Sciences Center to a high of $96,117 at the ETSU College of Medicine. Thus, the higher per-student state subsidy is, at least in part, a reflection of the specialized educational services offered by these institutions and the specialized faculty and facilities required to offer them.

It is also important to recognize that students at the specialized institutions generally, and at the healthcare-related institutions specifically, positively impact the state in ways other than their expenditures. The existence of such students makes available a greater quantity and quality of healthcare services in the state than if these institutions did not exist. Further, many nonresident students graduating from these

institutions will remain in the state to practice, and will continue to positively impact the state's economy over a longer time horizon than that covered by this study. Hence, the true benefit to the state of nonresident students at these institutions is higher than that estimated by this study and, as a result, the estimated benefit-cost ratios are understated.

2. Sensitivity Analysis

As discussed in the previous chapter, nonresident student expenditures on tuition and fees are subject to potential downward adjustments stemming from out-of-state tuition and fee waivers. The largest source of waivers of this type stems from nonresident graduate students receiving assistantships. The receipt of a graduate teaching or research assistantship allows for a waiver of out-of-state tuition.

Unfortunately, there are no data or mechanism for obtaining data that detail either the numbers of nonresident students on assistantship or the total amount of out-of-state tuition and fee waivers resulting from assistantships. This is a common problem faced by economic impact studies of this type, and most often is completely ignored.[6]

In an attempt to account for the extent of such tuition and fee waivers, a sensitivity analysis was conducted. First, the analysis reported in the previous section of this chapter was conducted assuming that no graduate students receive assistantships and therefore pay the full out-of-state tuition rate. Next, further analyses were conducted assuming that 50 and 100 percent of all graduate students are on assistantships,

[6] Of the five nonresident studies explored in the literature review of Chapter 2, only one (Rylander 2000) makes any attempt to note and/or account for out-of-state tuition waivers.

respectively, with expenditures on tuition and fees adjusted downward accordingly.[7] Table 4-06 details the findings of this sensitivity analysis.

Table 4-06 Results of Sensitivity Analysis on Adjustments for Out-of-State Tuition and Fee Waivers

Percentage of Nonresidents Receiving Assistantships	Direct Impact	Multiplier Impact[1]	Total Impact
0 %	$246,890,747	$165,389,846	$412,280,593
50	237,544,202	157,601,798	395,146,000
100	228,197,659	149,813,731	378,011,390

[1] Multiplier impact includes the total of *indirect* and *induced* impacts.
Note: Dollar figures are in 2001 dollars.

Considering this sensitivity analysis ranges from zero percent assistantships to 100 percent, the true figure must be within the range of results reported in Table 4-06. A shift from zero percent assistantships to a full 100 percent causes graduate tuition and fee expenditures to fall by $18.7 million and an approximate $34.27 million or 8.3 percent decrease in estimated total economic impact. Using this range of outcomes, every one percent level of assistantships above zero will result in an approximate decrease of $342,692 in estimated total economic impact.[8]

[7] An informal survey of Graduate Studies staff at APSU, UM, TSU, MTSU, UTM, and UTK indicated that during the Fall 2001 semester, an average of 18 percent of all graduate students received an assistantship of some type. The percent of graduate students receiving an assistantship ranged from seven percent at TSU to 32 percent at UTK.
[8] Some degree of caution is needed if these results are used for policy guidance. While the inverse relationship is valid, the magnitude of change holds only for the time period covered by this study.

3. The Impact of Federal Grants and Contracts

During 1999-00, the 11 public higher education institutions under study received approximately $227.83 million in Federal grant and contract revenue.[9] This revenue represents an inflow to the state through the institutions and their faculties for specialized research and educational services. As these dollars are expended in the course of performing the specialized services they fund, the state of Tennessee benefits.

While it may not be fully accurate to assume that none of these Federal dollars would have come into the state in the absence of the public higher education system, the existence of that system and the specialized pool of talent embodied in its faculty certainly allows the state to draw in such funds in greater amounts over a more sustained time period. Hence, the state enjoys some significant portion of economic benefit from these non-state funds as a direct result of the existence of its public higher education system.

Table 4-07 presents the findings of the economic impact analysis of Federal grant and contract dollars. Results of that analysis indicate that expenditures associated with

Table 4-07 Economic Impact of Federal Grant and Contract Dollars, 1999-00

Type of Impact	Direct Impact	Multiplier Impact [1]	Total Impact
Expenditure (Output)	$227,832,891	$174,231,057	$402,063,948

[1] Multiplier impact includes the total of *indirect* and *induced* impacts.
Note: Dollar figures are in 2000 dollars.

[9] This figure comes from FY 2000 audited financial statements at the Tennessee Comptroller's Office.

Federally funded research activity impacted Tennessee's economy by more than $402 million during the study period. Furthermore, these expenditures, both directly and through the multiplier process, supported some 5,740 jobs across the state.[10]

[10] Federal grant and contract dollars supported an estimated 3,511 direct jobs.

CHAPTER 5

SUMMARY AND CONCLUSIONS

A state's public higher education system, though costly to support, can be a source of many positive economic benefits enjoyed by citizens of that state. Unfortunately, much of the public discourse on higher education, especially in recent years, has focused on the rising costs of higher education – both to the student and the state – rather than its benefits.

A major focus of the analysis conducted by this study, as well as several others in the existing literature,[1] has been to quantify some portion of the economic benefits of Tennessee's public higher education system. Perhaps this quantification of benefits will serve to bring some balance to the ongoing discourse on the value and costs of higher education.

The purpose of this study has been to measure the total economic impact of direct expenditures associated with public higher education in Tennessee and arising from two primary non-state sources: nonresident students and Federally-funded grants and contracts. Section 1 of this chapter provides a summary of the results of this study. Section 2 discusses some of the contributions of this study to the body of literature on higher education economic impact studies, and discusses some suggested areas for future research. Finally, Section 3 discusses some applications to the pedagogy of economics.

[1] See Chapter 2 for a discussion of other Tennessee higher education studies.

1. Summary of this Study

During the 2000-01 academic year, some 13,930 full-time-equivalent nonresident undergraduate, graduate, and professional students studied in Tennessee's public higher education system. Also during that year, these students directly expended over $246 million in Tennessee's economy -- the total economic impact of which exceeded $412 million in output across the state. This figure equates to an average impact of $29,597 per FTE nonresident student. Additionally, these expenditures were found to support, both directly and indirectly through the multiplier process, some 7,619 jobs across the state.

Approximately 94 percent of the total $412 million impact is attributed to nonresidents at the state's public four-year institutions. The remaining 6 percent of impact is attributed to nonresidents studying at the state's specialized educational institutions.[2]

Given the average 2000-01 per-student state higher education subsidies to the institutions, a portion of the state's short-term cost to educate these nonresident students was found to be approximately $105 million. Based on the estimates of total economic benefit of $412 million and the short-term cost to the state of $105 million, the benefit-cost ratio for nonresident student education in Tennessee was found to be approximately 3.90. This ratio indicates that the state of Tennessee receives about $3.90 of benefit for every one dollar of state appropriations invested in nonresident student education.

[2] The specialized institutions include the ETSU College of Medicine, the UT College of Medicine and UT Health Sciences Center, the UT Veterinary Medicine Program, and the UT Space Institute.

This study also explored the economic impact of Federal grant and contract revenue flowing into and out of the 11 public universities in Tennessee. During the 1999-00 academic year, these 11 institutions received over $227 million grant and contract dollars from the Federal government. The total estimated output impact of the expenditure of these dollars on the state's economy exceeded $402 million.[3] Additionally, these expenditures were found to support an estimated 3,511 direct and 5,740 total jobs across the state.

The direct expenditures generated by nonresident students and Federally funded grants and contracts and considered by this study occurred in two different time periods, and hence should not be considered together without some degree of caution. However, since the two levels of expenditure occurred in very near time periods and there is no evidence to suggest that a structural change occurred in either source of expenditure, it would seem that these two sources of non-state funds can be combined for the purpose of understanding their overall magnitude. Doing so would indicate that these two sources of non-state funds accounted for a combined $814 million in economic activity in Tennessee, which equates to approximately 0.0048 percent of the state's 1999 gross product.

2. Contributions of this Study and Suggestions for Future Research

This study and its findings make several important contributions – at both the national and state level – to the body of literature on the economic impact of higher

[3] This figure is quoted in year 2000 dollars.

education. The purpose of this section is to briefly detail some of those contributions, and to suggest some areas for future research.

2.1. Contributions of this Study

This study represents one of only a handful of studies in the existing literature that has exclusively explored the issue of nonresident students or of Federally funded research. Most economic impact studies of higher education consider the impact of student spending and institution spending, but very few separately explore nonresident student and research-related impacts.

Consideration of the unique impact of nonresident students is relevant for at least two reasons. Those reasons are that:

- Nonresident students at the state's public institutions represent an inflow of dollars to the state that likely would not have occurred in the absence of the public higher education system; and,
- Nonresident students represent the filling of excess capacity. They fill existing desks and dorm rooms that might otherwise have gone unfilled – and in many cases pay a higher price in the form of out-of-state tuition for the opportunity to fill them.

Like nonresident students, the research capacity of the university attracts non-state dollars that might not have otherwise found their way into the state. As these research funds are expended, the state realizes the economic benefits associated with that expenditure.

A second contribution of this study is the provision of a suggested method, via the sensitivity analysis of Chapter 4, for dealing with the lack of data on out-of-state tuition and fee waivers. Lack of data on the extent or amount of out-of-state tuition and fee waivers is a common problem faced by nonresident student studies.[4] In fact, very few of the existing studies of this type even recognize the problem, and even fewer seek to do anything about it. Most often this data problem, along with its possible adverse impact on the findings of the analysis, are simply ignored. The sensitivity analysis offered by this study gives both a way of acknowledging the lack of data and a method for dealing with its influence on the outcome of the analysis.

Another significant contribution of this study is its exploration of an issue related to higher education in the state of Tennessee that has previously been unexplored. While several studies have addressed the economic impact of higher education in Tennessee on a variety of fronts, this study represents the first statewide study of the impact of nonresident students and Federally funded research.

2.2. Suggestions for Future Research

One significant byproduct of a study of this kind is that while conducting an in-depth exploration of one or two issues, one also identifies but is forced to leave unexplored (for the time being) several others. This limitation naturally leaves the door

[4] Consider for example the state of Tennessee. TBR and UT guidelines call for out-of-state tuition and fee revenue to be recorded in a separate account from in-state revenue. However, adjustments to out-of-state tuition and fees are either not recorded, or expensed through the same accounts as in-state adjustments.

open for future projects when time permits, or for other interested researchers as they come along.

First, Chapter 1 of this study details several impacts not addressed by this study. These impacts were not excluded because they were deemed unimportant, but rather because of potential data complications or their lack of compatibility with the focus of this study. These exclusions represent an obvious starting point for researchers interested in the economic impacts of higher education.

Second, as discussed on Chapters 2 and 3, only limited attention has been given to the university's longer-term impact on economic development.[5] This impact, though difficult to quantify and attribute to the university, is likely very significant for most major universities. This area of research represents a realm of significant opportunity within higher education research.

Third, little is known about the spending patterns of the typical nonresident student. On one hand, one might expect the average nonresident student to come from a more affluent family than the average resident. After all, they can afford to pay the additional increment of out-of-state tuition. On the other hand, they may be more financially strapped because of the higher cost of their education. Survey data that detail and quantify the spending patterns of such students would be a significant contribution to the literature.

[5] See Elliot, Levin, and Meisel (1988) for a discussion of this.

Fourth, an accurate understanding of some benefit cannot be divorced from the cost of achieving it. While the cost of educating a nonresident student can be approximated from the per-student state subsidy for all students, this measure cannot fully capture the cost of nonresident student education. In the short-term, nonresident students represent the filling of excess capacity. But, at least part of the capacity they fill may have been the result of the state's efforts in earlier periods to accommodate an overall level of enrollment that included both in-state and out-of-state demand. Hence, the state's fixed cost of educating students may remain unchanged in the short-run while variable costs respond to change in nonresident enrollments, but over the longer-term the fixed portion will vary with growing or shrinking overall enrollment levels.

Because of this fact it is important to recognize that over the long-term the cost of educating nonresident students may increase if the state has to build larger facilities to accommodate them. In simple terms, the short- and long-term benefit cost ratios for nonresident student education may be very different. Perhaps some research along these lines will prove to be fruitful as well.

3. Pedagogical Applications

The issues explored by this study are relevant to the pedagogy of higher education economics in at least two ways. First, the findings of this study hold several implications for the consideration of higher education policy, especially as it relates to nonresident student enrollment and out-of-state tuition. Second, they hold practical relevance for

the teaching of concepts related to the multiplier process and the thinking of economics, with specific applications to higher education.

3.1. Policy Implications

The nature, role, and implications of public policy are areas of interest to students in both economics and education. The natural meeting place of the two is in the realm and study of economic considerations in higher education policy. In a recent article entitled "The Challenge of Elevating Higher Education in the Public Agenda in Tennessee," Dr. Richard Rhoda (2001), Executive Director of the Tennessee Higher Education Commission, highlights several key challenges currently faced by the state's higher education system and policymakers, and details several important trends in the state's funding of higher education over the last decade or so.[6]

One important trend highlighted by Dr. Rhoda involves Tennessee policymaker's increasing tendency to pass along much of the cost of higher education to the student in the form of higher tuition and fees. This trend continued for the 2001-02 school year with a virtually unprecedented 15 percent tuition hike resulting from the state's continued budget woes.

The findings of this study clearly document the significant economic benefit that the state enjoys from nonresident students who study here. As has also been noted in this study, these nonresident students represent the filling of excess capacity within the

[6] THEC (2000) also highlights several important issues and trends in Tennessee higher education.

state's higher education system. By the nature of the fact that most of these nonresidents already pay significantly higher tuition rates because of higher out-of-state tuition levels, nonresident enrollment may be more sensitive to overall tuition changes. It is possible that, should significant tuition hikes continue into the future, nonresident enrollment will decline at a more significant rate than resident enrollment. This decline could lead to an increase in excess capacity and a loss of some or all of the economic benefits reaped from nonresident student enrollment in Tennessee.[7]

This study has also explored trends over the last decade or so in the realm of public sentiment that increasingly view nonresident students as an economic burden (Frost, Hearn, and Marine 1997). This trend, if left unchecked, could result in efforts by policymakers to curb nonresident enrollments.

The findings of this study and others like it have demonstrated that on average, the economic benefits of nonresident students significantly outweigh the costs of educating them. Policies designed to curb nonresident enrollment should only be considered in view of the loss of these benefits, or a sub-optimal policy may be reached.

3.2. Applications to the Teaching of Economics

An important component of understanding economic activity at the macro level, especially as it relates to fiscal and monetary policy, is an understanding of the multiplier

[7] Numerous studies on higher education tuition and enrollment clearly identify an inverse relationship between the two. See Heller (1996) for a review of the literature on this subject.

process. In simple terms, one dollar spent in the economy has more than one dollar's worth of impact because of the multiplier effect. The dollar's impact is multiplied into more economic activity as it changes hands through the economy. Fiscal and monetary policy efforts to stimulate the economy rely very heavily on this multiplier process.

An important part of the pedagogy and learning of any subject is the ability of the teacher to capture and hold the interest of the student. One key method for accomplishing this is to assist student in seeing the relevance of the subject matter to his or her own current or future life situation. Another method involves the presentation of the subject matter in terms the student can identify with and understand.

Virtually every undergraduate and graduate economics student is familiar with both their cost of attending the university and the kinds of expenses they face on an ongoing basis. This familiarity presents a natural foundation for exploring the multiplier process because it can be illustrated using subject matter the student understands and appreciates – namely his or her wallet and the contents (or lack of contents) thereof.

The issues related to the impact of nonresident students explored in this study embody key considerations related to the multiplier process. The results of this study can be used to demonstrate and explore that process on a variety of levels.

First, the findings of this study – that $246 million of nonresident student spending generates $412 million of economic activity within the state – provide a simple and understandable illustration of the multiplier process. As a practical exercise, students

could be given these numbers and asked to find the average multiplier. The answer, which equates to approximately 1.66, would be found by dividing the total economic benefit by the amount of direct expenditures.

On a broader level, the methodology and findings of this study and several of the key issues it highlights can be used to demonstrate fundamental concepts related to the thinking of economics. Issues related to the measurement of the state's cost of education introduce the fundamental recognition that dollars spent on higher education could have also been spent on some other project, and hence demonstrate the importance of considering the notion of opportunity cost.

Also, though the notion of externalities is not specifically addressed by this study, the recognition of the interrelationship of higher education funding, nonresident enrollment, and economy activity in Tennessee identified in this study provides a natural foundation for the exploration of concepts along such lines. Specifically, this study lays the necessary groundwork to show that higher education policy decisions that impact nonresident enrollment in Tennessee will also impact the state's economy.

In simple terms, the subject matter and findings of this study provide an easily understood foundation for teaching several fundamental economic concepts in the undergraduate classroom. On a more advanced graduate level, this study has pedagogical relevance to the teaching and study of higher education economics and policy.

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