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Letters about The Economic Impact of a University on its Local Community

Ralph Albert Gakenheimer

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AMERICAN INSTITUTE OF PLANNERS

JOURNAL OF THE AMERICAN INSTITUTE OF PLANNERS



Ralph A. Gakenheimer, *Editor*, Department of City and Regional Planning
New East Building, University of North Carolina, Chapel Hill, N.C. 27515

December 6, 1967

Mr. Ernest R. Bonner
2208 Park Hill Drive
Pittsburgh, Pennsylvania

Dear Mr. Bonner:

This is to accept for publication your manuscript on "Academics and Economics..."

A very difficult time we had in coming to a decision on this only partially accounts for the unfortunate delay. I regret to have tried your patience.

This is a joint acceptance with my successor as Editor, David R. Godschalk (at this same address), and further correspondence related to it should be addressed to him.

We will now move into the editorial work on the paper and be in touch with you about any problems which come up in this process.

Thanks for your patience during the lengthy review. I am sure the paper will be well received in the Journal.

Sincerely,



Ralph A. Gakenheimer

RAG:kk

AMERICAN INSTITUTE OF PLANNERS

JOURNAL OF THE AMERICAN INSTITUTE OF PLANNERS



Ralph A. Gakenheimer, *Editor*, Department of City and Regional Planning
~~McAllister~~ Building, University of North Carolina, Chapel Hill, N.C. 27515
New West

March 15, 1968

Mr. Ernest R. Bonner
2208 Park Hill Drive
Pittsburgh, Pennsylvania

Dear Mr. Bonner:

Your manuscript, "The Economic Impact of a University...", has been edited, and we now need your final approval of the latest revisions. These occur on pages 2, 3, 4, 5, 5-a, 12, 16, 19, and 20. They are mostly minor re-arrangements, as you can see from the enclosed Xerox copies.

The only remaining consideration is the matter of the mathematics in the latest version of the manuscript. There are still some unexplained things. We note that the data in column 5) of Table I has changed, causing changes in column 7). Was there an error in the original data, or is this an error in retyping? We are still confused by the addition on page 12, and ask that you supply figures for the blanks at the bottom of the page in our revision. (In your first draft, Table II showed total operating expenditures of \$23.5 million for 1966-67, though the text cited \$43 million.) Please look over all the figures and calculations carefully, since we have not checked them all and it would be embarrassing to include any mistakes in the published version.

It would be helpful if you could send an additional copy of the latest version of the paper, when you respond to the questions in this letter and indicate your approval of our final revisions. Thank you.

Sincerely,


David R. Godschalk
Editor Designate

DRG:gd
Enclosure: Corrected pages

AMERICAN INSTITUTE OF PLANNERS

JOURNAL OF THE AMERICAN INSTITUTE OF PLANNERS



Ralph A. Gakenheimer, *Editor*, Department of City and Regional Planning
New East Building, University of North Carolina, Chapel Hill, N.C. 27515

December 26, 1967

Mr. Ernest R. Bonner
2208 Park Hill Drive
Pittsburgh, Pennsylvania

Dear Mr. Bonner:

Mr. Gakenheimer has referred your manuscript to me since it will be published during my term as editor. It is our intention to publish it as a Planner's Notebook item; hence, it will need to be considerably shorter than its present form.

We have undertaken to revise your paper to the shorter length and style of our usual Planner's Notebook pieces, as you will note from the enclosed edited copy. Please look over the manuscript carefully, make any final corrections you deem necessary, respond to the questions raised, and return it to us at your earliest convenience.

The only major question which was not apparent in reading the manuscript was the mathematics behind the 1980 expenditure figure of \$69 million. Perhaps you can clarify this in the revisions. Also note that some summary statement of quantities would help to close off the discussion. Please furnish us with a biographic sketch similar to those in recent Journals. Thank you.

We look forward to hearing from you.

Sincerely,

David R. Godschalk
Editor Designate

RAG:kk
encl. Edited Manuscript

46,989,419

REGIONAL ECONOMIC DEVELOPMENT INSTITUTE, INCORPORATED

April 2, 1968

C
O
P
Y
Mr. David Godschalk
Editor Designate
AIP Journal
New West Building
University of North Carolina
Chapel Hill, N.C.

Dear Mr. Godschalk:

I am returning to you a copy of the revised paper. You will notice I have made some very minor revisions in your suggested revisions. As it now stands, it has my final approval.

Columns 5 and 7 of Table I were different from their respective columns of Table II in the original draft as the original mathematical error affected them directly. Confusion may have arisen because of a typo error in footnote (b).

On page 12, I have supplied the figures you requested. In addition, I have broken down 1966-67 operating expenditures into the two broad categories in which the university reports its expenditures to facilitate comparison of these figures with annually reported data from the university.

Thank you for your patience.

Respectfully,

Ernest R. Bonner

ERB:cr

Enclosure

THE ECONOMIC IMPACT OF A UNIVERSITY
ON ITS LOCAL COMMUNITY

By
Ernest R. Bonner

January 1968

BIOGRAPHIC SKETCH AND CREDITS

The author is a PhD candidate at the Department of Economics, University of Pittsburgh. He will join the faculty of the Department of Urban and Regional Planning at the University of Wisconsin in Madison in September of this year.

This paper was made possible by studies performed for the National Aeronautics and Space Administration under Research Grant No. NsG-474. The author also wishes to acknowledge assistance from the Regional Economic Development Institute, Inc., Pittsburgh, Pennsylvania as well as helpful comments and suggestions from Mr. Norman Krumholz, Dr. William H. Miernyk, Professor K.C. Parsons and Mr. Mark Meredith of the Colorado University planning office. Errors of omission and commission remain the author's.

THE ECONOMIC IMPACT OF A UNIVERSITY
ON ITS LOCAL COMMUNITY

Ernest R. Bonner

There is little doubt that a major university is a significant economic force in its community. In addition to multi-million dollar annual payrolls, universities spend several additional millions annually with local businesses. In many smaller areas across the country the local college or university is the largest single sector of economic activity. Further, with higher education growing at an unprecedented rate, it is not surprising to find many institutions of higher learning not only the dominant economic force in their communities but the fastest-growing as well.

Given the growing economic importance of higher education both nationally and regionally, it is paradoxical that little is known about the local economic impact of colleges and universities. There is a general lack of published material dealing specifically with this subject, and those studies which have been undertaken do not adequately assess the university's total impact.¹

¹ To the author's knowledge only a few studies have been accomplished. See, for example, Francis S. Duty, The Immediate Economic Impact of Higher Education in New England, Boston Univ. Bureau of Business Research, 1961, Boston; Ralph G. Wells, ed., New England Council Education Study, The Economic Value of Education Institutions to New England, Bureau of Business

Typically, only the direct effects of university expenditures have been estimated. No attempts -- to the author's knowledge -- have been made to expose those indirect economic effects which are the result of interindustry linkages within the community -- effects which, for all their subtlety, can nevertheless be significant.

This paper, in presenting a methodology for estimating the economic ramifications of university operation, attempts to suggest:

1. How much of total community production can be traced to its origin as a university expenditure?
2. What part of the total employment in the community may be considered as "service" to the university?
3. What will be the possible effects of university growth on the economic activity of the locality?

Answers to these questions should prove useful to community planners estimating the economic effects of the local higher education industry. In view of the spectacular recent growth

Research, Boston University, College of Business Administration, (Boston: 1951); Economic Profile of University City, Philadelphia, West Philadelphia Corporation, (Philadelphia: December 1963); John L. Kraushaar, "How Much of an Asset is a College?" College and University Business, Vol. 36, February 1964, 43-45. Impact 1 - The Economic Impact of Le Moyne College on the Syracuse, New York Community, prepared under the direction of Dr. Roy Geraurd, Director, Bureau of Economic Research, Le Moyne College, Syracuse, New York; Peter B. Karabashian, "The Economic Role of the University in the Community," unpublished manuscript, Cornell University, May 1965. Charles S. Baldwin, "Higher Education - Its Economic Potential in the San Diego Area," Economic Research Department, Copley Press, Inc., 1960 (?).

of higher education and projections of even more startling advances, forecasters of local economic activity must attempt some estimate of university impact. In some smaller cities the university alone may hold the key to economic growth; but even in the largest city changes in university operations will influence planning requirements.

A detailed economic analysis may also be useful in moderating the views of those who maintain that a university is an unqualified burden to a community. The legendary feud between town and gown, partially based on the notion that the university takes much from the community in services and returns little in taxes, may be mitigated by revealing the university as a prime economic resource of the community.

A University's Total Economic Impact

Each dollar directly expended by the university generates a host of indirect transactions, some of which take place among firms having no obvious direct contact with the university. Take the case of a local firm supplying goods or services to the university. Part of the firm's expenditures for office

rent, supplies, and maintenance filter through the economy as indirect effects of its university business dealings. The sum of all these secondary transactions is typically referred to as the indirect effect, whose relative magnitude is dependent upon the degree of structural economic interdependence of the community. Smaller communities do not typically display significant structural interdependence, and will have relatively small indirect economic effects.

In addition to direct and indirect effects, the total economic impact of the university cannot be assessed without considering induced effects as well. The university, as well as firms serving the university, will make payments to households in the form of increased wages or salaries of new employees, dividends and interest. This increased income will be spent by its recipients in demands for more goods and services from local retailers and others. The sum of all changes attributable to changes in local household consumption are referred to as the induced effects.

The total impact of the university upon its community will be defined as the sum of the direct, indirect, and induced effects. "Total" is used here in that sense only; there are real economic effects which cannot be estimated within the

context of input-output analysis and the available data. One such effect is the influence which a major university may have on the location decisions of other industries. Input-output analysis does not take account of the interactions between scientists in an industrial laboratory and those on a university campus, which may be a major factor in determining the location of the laboratory. Data on the local expenditures of students whose income comes from outside of the area may not be available, though conceptually these expenditures are an effect of the university. Nevertheless, interindustry input-output analysis does reveal those subtle indirect and induced relationships between the local economy and a university, and may show that a tax-supported university is an important factor in the economic development of a community.

A Case Study of the University of Colorado at Boulder

Boulder, Colorado offers a case study setting in which a previously-derived input-output analysis and a detailed set of government accounts permit an estimate of total economic effects of the University of Colorado on the Boulder area.² With this study as a basis, a "multiplier" was developed to estimate the dollar stimulus to community production as the

² William H. Miernyk, et.al., Impact of the Space Program on a Local Economy, West Virginia University Library, Morgantown, West Virginia, 1967.

university's operating budget expands. The analysis also permits some estimates of university impact upon the State of Colorado, which, though less definitive, reveal the university as a major state industry.

The input-output multiplier shows the direct, indirect and induced effects on the Boulder area as the university adds one dollar to its operating budget. It is perhaps best explained by reference to Table 1.³ Column 1 in this table indicates the direct effect of one dollar of university expenditures on the local economy. These are the effects typically reported. Columns 2 and 3 indicate the indirect and induced effects which must be added to the direct to get the total effects in column 4. It is possible from this table to estimate the total effects of university spending on any of 31 sectors of economic activity in the Boulder area.⁴

The printing and publishing sector, for example, would be called upon to increase its sales 1.7 cents, eating and drinking 2.2 cents, all other services almost 3.9 cents, and so on. All sectors except space would be affected by an increase in the university's budget.

³ Only those parts of the accounts relevant to this discussion are included in Table 1. For the complete transactions table; direct coefficients table; and direct, indirect and induced coefficients tables, see source cited in footnote 2.

⁴ The Boulder area as defined by the study included all territory within the Boulder telephone exchange. This area was larger than the city but included no other incorporated municipalities of any size.

TABLE 1

		Increase in Production Required to Support \$1.00 Increase in University Budget			
		(1)	(2)	(3)	(4)
<u>Industrial Sector</u>		<u>Direct</u>	<u>Indirect</u>	<u>Induced</u>	<u>Total</u>
1.	Extractive (agric. and mining)	.00015	.00032	.00369	.00416
2.	Food and Kindred Products	.00094	.00003	.00675	.00772
3.	Furniture and Fixtures	.00007	-0-	.00165	.00172
4.	Printing and Publishing	.01191	.00061	.00487	.01739
5.	Stone, Clay and Glass Products	.00011	.00005	.00094	.00110
6.	Machinery (non-electrical)	.00016	.00002	.00009	.00027
7.	Professional and Scientific	-0-	-0-	.00007	.00007
8.	All Other Manufacturing	.00007	.00003	.00154	.00164
9.	Space ^{a/}	-0-	-0-	-0-	-0-
10.	Space-Related ^{a/}	.00118	-0-	.00010	.00128
11.	Automotive Dealers	.00019	.00006	.00969	.00994
12.	Gasoline Service Stations	.00001	.00013	.00413	.00427
13.	Eating and Drinking	.00035	.00003	.02207	.02245
14.	Food Stores	-0-	.00001	.01123	.01124
15.	Lumber, Build. Materials, etc.	.00032	.00006	.00199	.00237
16.	General Merchandise	.00020	.00001	.00470	.00491
17.	Apparel and Accessories	-0-	-0-	.00461	.00461
18.	Furniture and Appliances	.00021	.00001	.00580	.00602
19.	All Other Retail	.00574	.00024	.00737	.01335
20.	Wholesale	.00176	.00019	.00287	.00482
21.	Professional	.00143	.00036	.01482	.01661
22.	Lodging	.00092	.00001	.00055	.00148
23.	Real Property Rentals	.00083	.00113	.03214	.03380
24.	Other Rentals	.00119	.00011	.00214	.00344
25.	All Other Services	.00396	.00135	.03342	.03873
26.	Contract Construction	.00090	.00037	.00533	.00660
27.	Transportation	.01044	.00077	.00768	.01889
28.	Utilities	.01192	.00148	.02722	.04062
29.	Finance, Ins. & Real Estate	.00105	.00128	.02969	.02929
30.	University of Colorado	1.00000	.00002	.04317	1.04319
31.	Local Government	-0-	.00151	.02126	.02277
TOTAL			Multiplier =		<u>1.37475</u>

^{a/} Space sector defined as all activities funded completely or partially by the National Aeronautics and Space Agency. The Space-Related sector included those activities indirectly linked (in a financial or functional sense) to the nation's space effort. A complete discussion of the criteria used can be found in Miernyk, op. cit.

TABLE 1 (Continued)

Estimated Increase in Production (Dollars) and Employment (Man Years) Required from all Boulder Sectors to Support Increase in University of Colorado Budget of 47 Million Dollars

Sector	(5) Estimated Increase in Production Re- quired (thousands of dollars) ^{b/}	(6) Employment Production Coefficients ^{c/}	(7) Estimated Increase in Employment Gen- erated (Man Years) ^{d/}
1.	195.5	.0275	5.4
2.	362.8	.0263	9.5
3.	80.8	.0664	5.4
4.	817.1	.0749	61.2
5.	51.7	.0398	2.1
6.	12.7	.0568	.7
7.	3.3	.0467	.2
8.	77.1	.0420	3.2
9.	0	.0585	---
10.	60.1	.0585	3.5
11.	467.1	.0878	41.0
12.	200.6	.0871	17.5
13.	1,054.9	.0862	90.9
14.	528.2	.1254	66.2
15.	111.4	.0590	6.6
16.	230.7	.1145	26.4
17.	216.6	.1612	34.9
18.	282.9	.0624	17.7
19.	627.3	.0864	54.2
20.	226.5	.0350	7.9
21.	780.5	.0762	59.5
22.	69.5	.0602	4.2
23.	1,588.2	.0012	1.9
24.	161.6	.0210	3.4
25.	1,819.0	.0769	139.9
26.	310.1	.0471	14.6
27.	887.6	.0520	46.2
28.	1,908.7	.0352	67.2
29.	1,376.3	.0169	23.3
30.	49,018.9	.0624	3058.8
31.	1,069.9	.1008	107.9
TOTAL	64,597.6		3981.4

^{b/} Each entry in column (4) times 47 million dollars. These are increases in annual sales or production (as defined by the Miernyk report) over and above the current sales of various sectors.

^{c/} Source: Miernyk, et. al., Impact of the Space Program on a Local Economy, op.cit., pg. 125.

^{d/} Column (5) x Column (6). Number of additional man years employment required by sectors in the Boulder area to support postulated increase of 47 million dollars in university operating expenditures. These man years are in addition to current employment levels.

A comparison of direct effects (column 1) with total effects (column 4) shows the importance of indirect and induced effects in assessing the total local impact of university spending. If only the university's direct expenditures in the printing and publishing sector are considered, sales will increase 1.2 cents for every dollar increase in the university's spending. But total effects amount to 1.7 cents, an increase of almost 50 percent over the direct estimate alone. Table 1 also makes clear that some sectors indirectly affected are not obviously linked to university spending. Food stores, for instance, show no direct links to the university. Yet the expenditure of each university dollar spurs indirect and induced spending of over 1 cent on food store products. These hidden effects are completely unaccounted for in an analysis of direct expenditures only.

Given the foregoing estimates of the changes provoked in each local sector as the result of an increase of one dollar in the university's budget,⁵ it is possible to predict the

⁵ This "multiplier" (1.37 for the university) has been estimated for each of 30 other local sectors of economic activity in the Boulder area. It may be of interest to compare the university's impact multiplier with those of a selected few of these other sectors:

Printing and Publishing (mfg.)	1.40810
Non-electrical Machinery (mfg.)	1.27513
Eating and Drinking (retail)	1.35324
Professional Services	1.55568
Utilities	1.26921

For the multipliers of all Boulder sectors see Miernyk, et.al., Table V-13, pg. 128.

total dollar change in economic activity throughout the Boulder economy for any assumed change in university operating expenditures. What remains to be done is to estimate future operating expenditures at the university, an effort fraught with both theoretical and practical difficulties.

In order to predict future university operating expenditures, these will be considered a function of full-time-equivalent student enrollment. It is assumed in this paper that FTE enrollment on the Boulder campus of the University of Colorado will reach 25,000 in 1980.⁶ Given the assumed future university enrollment, it is postulated that the past relationship between enrollment and expenditure will hold in the future. The relationship will be of the general form:

$$O = a + bE$$

⁶ See "Twenty Thousand Students: The Program for the Revised Campus Development Plan," University Planning Office, University of Colorado, Boulder, May 1963, where the following comments appear:

"The Campus Development Plan is programmed to provide a balanced system of physical facilities for 20,000 FTE students, expected in the early 1970's. There is no guarantee that growth can be stopped at 20,000; in fact, there is every indication that the university may be compelled by sheer volume of demand to continue to absorb more students through 25,000 and even 30,000."

p. 25. The assumption of 25,000 students in 1980 is made for convenience in this study and is not based on explicit university policy.

where: O = annual operating expenditure of the university, and
 E = full-time equivalent enrollment at the university.
 a and b are numerical constants.

This linear relationship notes that variations in operating expenditures of the university are associated with variations in enrollment. The parameters of the equation have been determined statistically from past experience at the university, using the method of least squares. The regression of operating expenditures on enrollment yields the following specific relationship:

$$O = -28,835,581 + 3,453 E^7$$

The numerical coefficient of the E term, an estimator for predicting the increase in university operating expenditures for each additional full-time equivalent enrollee, states that, in the recent past, an increase of one FTE student has been associated with an increase of approximately \$3,453 in operating expenditures. If we are willing to assume that this association will continue, increased operating expenditures

⁷ An intuitively obvious explanation for the negative value of the intercept is that recent years have seen significant growth in operating expenditures compared with student enrollments, perhaps due to a larger proportion of graduate students. Thus, a regression line derived from experience between 1955 and 1967 can have little significance in explaining phenomena of the distant past.

at the university are simply the estimated increase in FTE enrollment times \$3,453.⁸

However, total expenditures for educational and general functions do not include disbursements made by the university for non-education expenditures (mainly funded research and instruction expenditures and capital outlays not involving special revenues) and for auxiliary activities (food service, dormitories, printing, etc.). Since these expenditures are not meaningfully related to student enrollment, they have been excluded from the regression analysis. But they are included in the "output" of the university in the input-output analysis, and thus estimates of operating expenditures per student should be modified to include them. Therefore, a modified estimate of \$4,753 was used, with the additional \$1,300 representing these non-education and auxiliary expenditures.

In 1966-67, fall term FTE enrollment on the Boulder campus' of the university was an estimated 15,411. Increases in this enrollment to 25,000 by 1980 will result in an increase in annual operating expenditures of approximately \$47,000,000, more than 100 percent growth in a little over 10 years. (1966-67 operating budget of approximately \$43 million plus estimated \$47 million increase equals estimated total 1980 operating budget of \$90 million.)⁹

⁸ A high correlation coefficient ($r=.993$) and a low standard error on the b coefficient (131 dollars) both indicate a significantly close relationship between operating expenditures and enrollment.

⁹ 1966-67 operating budget of \$43 million comprised of an estimated \$23.5 million expenditure for educational and general functions plus an estimated \$19.5 million for non-educational expenditures.

The Total Impact of University Spending on the Boulder Community

It will be recalled that each dollar of increased spending by the university eventually stimulates total community production of \$1.37. Thus the estimated 47 million dollars of new annual spending by the university (associated with 25,000 FTE enrollment) promotes over 64 million dollars of new annual sales or production in the Boulder area. It can be seen from Table 1 (Col. 5) that demands will be placed upon all local sectors as the university expands. An increase in enrollment to the 25,000 FTE enrollment level will require increased annual production of \$817,146 from the printing and publishing sector, \$1,054,912 from eating and drinking, \$780,494 from professional services, \$1,819,000 from all other services, over \$1,900,000 from utilities, \$1,376,320 from finance, insurance, and real estate, and over \$1,000,000 from local government, all in addition to the level at which they are now producing.

University Impact on Local Employment

In addition to estimates of production, it is possible to estimate the increase in community employment which will accompany the university's growth. Employment as a measure of impact has certain advantages for planning purposes over an output measure, for it can be used to approximate demands upon housing, schools and municipal facilities.

Increases in employment were related to increases in production or sales by the Boulder study through worker productivity in each of the local sectors. The assumption was made that employment was related to output in the following way:

$$N_i = a + bO_i$$

where: N_i = full-time-equivalent employment in sector i

O_i = output of sector i

a and b are parameters.

The b coefficients (or employment multipliers) for each sector, reported in column 6 of Table 1, are an estimate of the change in each sector's employment as that sector changes its output.

Changes in output caused by university expansion, when combined with the employment multipliers, provide an estimate of almost 4,000 new employees in all local sectors generated by an assumed university expansion to 25,000 enrollment.

Most of this change in employment will be as a direct result of university growth. Over 3,000 new employees, both faculty and staff, will be required by the university itself. The remainder (close to 900) will be employed by other sectors of economic activity in the area.

This increase in employment will certainly result in some in-migration. Though some of the new employees will be local residents newly entering the labor force, most will be migrants

into the locality. These new families will demand not only a full range of goods and services from local firms but housing, schools, and municipal facilities as well. Complete specification of these demands will not be attempted here. But it is entirely possible that at least 1,000 new housing units with attendant municipal facilities and services will be demanded, just to satisfy university expansion.

Impact of Student Expenditures

Along with the impact of the university itself on the community, is the impact of expenditures by students. While student expenditures loom large in any discussion of local economic activity and can easily be handled within the analytical framework of the input-output methodology we have used here, several problems discourage the analyst.

Foremost among these problems is that of estimating the distribution of student expenditures among the sectors of economic activity in the Boulder area. What and how much do students buy locally? It is reasonable to assume that the expenditure patterns of students differ from that of non-students in the population.¹⁰ Secondly, to the extent that

¹⁰ If student expenditures do not vary from the population as a whole, of course, our problem is solved for the input-output table provides an estimate of the expenditures pattern of all households in the area.

students are employed by local firms or the university, their impact on the local economy has already been estimated. That portion of student income which originates from outside the region and may have substantial impact on the community, however, has not been included. Further, that income and its local impact are difficult to assess inasmuch as it may fluctuate widely from year to year.

These problems would largely vitiate any efforts here to obtain reasonable estimates of the impact of student expenditures. Until some estimate of student expenditure patterns and sources of income is available, the input-output analysis cannot validly proceed. On the other hand, the magnitude of impact of student expenditures on the local community prompts some comments. In 1963, sample interviews with the student population provided an estimate of total student expenditures in excess of 30 million dollars. This suggests an average annual expenditure of approximately \$2,000 per student. If only half of each student's annual expenditures are made locally (with income derived from sources outside the area) and if the FTE enrollment reached 25,000 eventually, at the present level of expenditure the students would spend, in addition to what is now being spent, approximately \$10,000,000 annually with local firms. Admittedly, this estimate is crude, but it should provide some feeling for the importance of student expenditures to local economic activity.

It must also be noted that this is only the direct effect of student spending. It does not measure those indirect and induced effects which have been shown to be significant with respect to the university itself.

University Impact on the State of Colorado

More than one-third of all university expenditures are made outside Boulder, the bulk of these in the Denver metropolitan area. Theoretically then, the university's impact on other areas of the state and nation may also be estimated from the results of the input-output table. This estimate, though, must be conditioned upon an important assumption. Earlier it was noted that the expenditure of one dollar by the university invoked \$1.37 worth of production or sales in the Boulder area. It will be assumed, conservatively, that this "multiplier" holds for areas outside Boulder, specifically in the Denver metropolitan area where most university imports originate.¹¹

Interviews with university purchasing personnel show that the university spent close to 9 million dollars in Denver during 1963. This amounts to almost 25 percent of the university's 1963 operating expenditures, and was only slightly less than

¹¹ A multiplier of 1.37 in the metropolitan area is probably too low, for the size of the area suggests that its structural economic interdependence is much greater than in Boulder, since larger areas will usually be characterized by higher multipliers.

the state appropriation to the university of a little over \$9,300,000. The total annual impact of this expenditure in Denver is estimated as \$11,976,000, assuming a local multiplier in Denver of 1.37.

If it is further assumed that the university will continue to import from Denver in the same proportional amounts as it now does, an increase in annual operating expenditures of \$47,000,000 (FTE enrollment to 25,000) will foster additional annual purchases in Denver of approximately 11.75 million dollars. These estimated direct purchases will then promote additional indirect and induced effects of over 4 million dollars, totaling an additional annual impact on Denver of \$16,150,000. When the additional total impact of over 16 million dollars is added to the present total impact of almost \$12,000,000, it can be seen that an increasing amount of economic activity in the Denver area will be stimulated by the university as it increases its enrollment.

This same analysis can be accomplished for the state, excluding Denver and Boulder. In 1963 the university spent almost \$400,000 with firms in the state outside Boulder or Denver, a little over 1 percent of its total operating expenditures. If this proportion holds in the future, and if the multiplier in the rest of the state is assumed to equal 1.37 as in Boulder, the total impact of the university on the rest of the state would be over \$1,000,000 annually. Thus state

appropriations to the university are an investment with substantial economic returns for firms within the state, because university expenditure of these appropriations sets in motion a chain of transactions which involve not only Boulder firms but firms in Denver and other parts of the state as well. The foregoing analysis underlines the importance of these "hidden" indirect and induced effects.

Conclusion

In the case at hand the indirect and induced effects of university spending were significant and, combined with the direct effects, show Colorado University as a major contributor to the growth of Boulder and a not insignificant one to the growth of the entire state. The projected enrollment increase on the Boulder campus is expected to generate an increase of about 65 million dollars in the annual level of economic activity in the Boulder area, along with almost 4,000 new jobs. Increased student expenditures will add an estimated \$10,000,000 a year. The Denver Metropolitan area will realize an estimated 16 million dollars of new economic activity and the rest of the state more than a million.

The input-output framework is especially suited to estimates of total university impact. However, it is expensive to prepare the basic transactions table of an economy,¹² and higher educational institutions are not normally given a unique sector in the transactions table. For these reasons, other university communities will not always be able to avail themselves of this kind of analysis. Still, the techniques and the results may be useful to planners and others concerned with the university and its impact on the urban environment in demonstrating that the economic influence of the university is not bounded by its own ledger sheets nor its immediate geographic locale.

12

Recent work has focused on this problem. See Technique for Area Planning: A Manual for the Construction and Application of a Simplified Input-Output Table, prepared by Regional Economic Development Institute, Pittsburgh, Pa., for the Economic Development Administration (Contract No. C-306-66, Neg.).