The Economic Impact of Research Activities at The University of Texas at El Paso (Fiscal Year 2010-11)

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Summary Sheet

Total Impacts on Texas

• UTEP Research Expenditures injected into the State Economy	$ 33.2 million
• Total (direct + indirect + induced effects) annual output in Texas derived from operational expenditures	$ 55.0 million
• Total jobs supported annually in Texas	740
• Total annual labor income to Texas workers and self-employed individuals	$ 32.0 million

Impacts on El Paso County

• UTEP Research Expenditures injected into El Paso County	$ 29.1 million
• Total (direct + indirect + induced effects) annual output in El Paso County derived from operational expenditures	$ 48.3 million
• Total jobs supported annually in El Paso County	676
• Total annual labor income to El Paso workers and self-employed individuals	$ 28.8 million

Impacts on the Rest of Texas

• UTEP Research Expenditures injected into other Texas Counties	$ 4.1 million
• Total (direct + indirect + induced effects) annual output in El Paso County derived from operational expenditures	$ 6.7 million
• Total jobs supported annually in other Texas Counties	64
• Total annual labor income to El Paso workers and self-employed individuals	$ 3.2 million

Introduction

With over 22,500 students, an operating budget of over $400 million, and employing nearly 3,000 individuals, The University of Texas at El Paso (UTEP) continues to be a significant contributor to the local and regional economy. In recent years, through construction of new facilities and increased expenditures in research, UTEP has undertaken an effort to reach Tier One status. To that effect, UTEP's Office of Research and Sponsored Projects (ORSP) asked the Institute for Policy and Economic Development (IPED) at UTEP to undertake an economic impact study in order to quantify the economic impacts of research activities conducted at UTEP on the County of El Paso, as well as the rest of the state of Texas. Specifically, this report estimates the effect that research activities at UTEP have on output, employment, and labor income.

Located on the U.S.—Mexico border, in one of the largest binational communities in the world, UTEP is unique among research institutions. UTEP currently educates approximately 22,600 students, the majority Hispanic, and employs 1,241 and 1,649 individuals as faculty and staff, respectively.[1] It is ranked second among UT System academic institutions in annual federal funded research according to the Texas Higher Education Coordinating Board.[2] UTEP's unique location places it in the presence of a strong manufacturing and military sector which allows for a variety of research opportunities. Additionally, according to a 2010 IPED report, the total impact of UTEP related expenditures on local business volume is estimated to be $369 million.

Subsequent sections of this report include a description of the methodology employed followed by the data and assumptions made regarding how research expenditures were employed. Then, the economic impact results are discussed followed by some concluding remarks.

Methodology

To estimate the economic impact of research activities at UTEP on El Paso County and the rest of the State of Texas, a modeling technique known as Input-Output (I-O) analysis is utilized. I-O analysis illustrates how industries and institutions are linked by the intermediate inputs they provide one another to produce the final output in a given economy. For example, in order to produce a good or provide a service, an industry or institution requires materials, products and services from other supplier industries

[1] The University of Texas at El Paso. *Facts.* Retrieved March 28, 2012, from utep.edu: http://universitycommunications.utep.edu/facts/index.html

[2] Texas Higher Education Coordinating Board. *Total Expenditures for Research by Source of Funds Universities and Health-Related Institutions FY 2011*. Retrieved March 28, 2012, from Texas Higher Education Coordinating Board Online Report System: http://www.thecb.state.tx.us/AAR/ResearchExpenditure/

or institutions. Similarly, these supplier industries require materials, products and services to produce the intermediate inputs that will be used for the provision of the final product or service. Essentially, an I-O model captures all rounds of inter-industry/institutional relationships that make up the production processes of industries in a given economy. Therefore, an I-O model can be used to estimate the regional effects of a particular change or shock to that region's economy.

Inter-industry/institutional relationships and their overall economic effects on a region are measured using ***multipliers***. ***Multipliers*** estimate the total change in an economy resulting from a one unit change in production, employment, income, or some other component of value added. For example, an employment multiplier of 2.1 suggests that for every one job created by a given industry, an additional 1.1 jobs will be generated within the region. It is important to note that different industries or sectors will vary in multiplier size. For instance, industries exhibiting higher levels of interdependence with other industries in a given economy will typically be characterized by larger multipliers. Thus, industries relying less heavily on imports will generally have larger multipliers relative to those requiring commodities and services produced outside the given economy.[3] Consequently, larger regions will often have larger multipliers than smaller regions.

There are several I-O commercial software packages available, each of which provides its own unique regionalized multipliers. The model chosen for this study is the ***IMPLAN*** or ***IM***pact analysis for ***PLAN***ning system.[4] Similar to traditional regional economic modeling techniques, IMPLAN employs a top-down approach, using national data as a control total for state data, and state data, in turn is used as a control total for county data. In addition of being flexible and relatively easy to modify, IMPLAN explicitly breaks out impacts into three types of effects measured by its multipliers, making this an attractive I-O software package.[5] The three types of effects measured by the IMPLAN multipliers used in this report include the ***direct***, the ***indirect***, and the ***induced*** effects.

The ***direct*** effect refers to the initial change in demand resulting from new or current expenditures or current employment levels. This effect is the impact that is actually applied to the predictive model for analysis. I-O multipliers are then used to generate changes in other regional economic sectors given the expenditure or employment value of interest. Examples of a direct effect include decreases in operational expenditures due to budget cuts, increases in hospital employment levels, and the amount of future construction expenditures.

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[3] Miernyk, W. H. (1965). *Elements of Input-Output Analysis.* New York: Random House.

[4] IMPLAN Professional©, Version 3.0. (1993). *Minnesota IMPLAN Group, Inc.*

[5] Rickman, D. S., & Schwer, K. (Fall 1993). A Systematic Comparison of the REMI and IMPLAN Models: The Case of Southern Nevada. *The Review of Regional Studies* , 148-149.

Indirect effects represent all changes in regional industry activity, such as increases or decreases in production and employment that result from the direct effect. For example, increases in construction expenditures for non-residential structures will result in increased sales of steel, concrete, windows, and other necessary materials and equipment from supplier industries within the region. This increased supplier industry activity is captured by the indirect economic impact.

Finally, the ***induced*** effect measures the impact of household spending within a region due to changes in labor income, or compensation received by business proprietors and workers for both the directly and indirectly impacted regional industries. Continuing with our previous example, increases in construction expenditures and supplier industry output generate increases in labor income to support this additional construction and supplier industry activity. Households then spend a portion of this income on various goods and services produced within the economy, further increasing regional sales, employment, and income for other local economic sectors. The sum of these three effects represents the total impact of the new or current expenditure value or employment level of interest.

IMPLAN provides information and impact results for three key regional economic variables: ***output, employment, and labor income***. Accordingly, economic impact values in these three categories are estimated for UTEP research expenditures for the year 2011. Each of these categories is defined below:

1. ***Output –*** represents the total value of industry production or the value of all goods and services produced within the local economy.[6] Output is an overall measure of economic activity and it is the sum of income paid to all factors of production as well as all inter-industry purchases.

2. ***Labor Income –*** represents the sum of compensation paid to workers as well as business proprietors. This value includes employer paid benefits and payroll taxes, in addition to wages and salaries.[7] Note that when interpreting the results of this study, labor income and output should not be summed, as labor income is a component of output.

3. ***Employment –*** represents the average annual jobs within a sector and consists of both full-time and part-time positions.[8] This approach is consistent with the international standard for counting the number of jobs in an economic system.

[6] Minnesota IMPLAN Group, Inc. *Glossary.* Retrieved April 17, 2010, from IMPLAN.com Economic Impact Modeling Solutions: http://implan.com/v3/index.php?option=com_glossary&Itemid=164

[7] Minnesota IMPLAN Group, Inc. *Glossary.* Retrieved April 17, 2010, from IMPLAN.com Economic Impact Modeling Solutions: http://implan.com/v3/index.php?option=com_glossary&Itemid=164.

[8] Ibid.

The next section reviews the data provided by the UTEP Office of Contracts and Grants which detailed all estimated research expenditures. In addition, the following section provides an overview of the assumptions made by IPED in order to estimate the economic impact estimates.

Data

The IMPLAN model requires some basic information in order to estimate the total (direct + indirect + induced) impacts of research endeavors on output, employment, and labor income in the area of interest. UTEP's Office of Contracts and Grants provided IPED with a summary of research expenditures for Fiscal Year 2010-11, which consisted of line-item expenses organized by type of expenditure and by the city in which each expense occurred, in addition to salaries paid (including benefits). These expenses totaled approximately $43.3 million and served as inputs to the IMPLAN model. However, for the purpose of this study, IPED only identified those expenses that occurred in Texas; any expense that could not be traced to a particular city, or that occurred outside Texas, was excluded from the analysis. From here, it was necessary to assign each type of expense to a corresponding industry in the IMPLAN model, as well as aggregate them by county. Some expenditure items were too general in their description and could therefore not be assigned to a particular IMPLAN industry category. Examples of these items include "Other Fees," and "Official Occasions." Pass-thru items were assumed to be payroll expenses and all employee compensation figures and their impact were estimated separately. Lastly, all impacts were aggregated.

Given the available data, as well as IPED's assumptions, UTEP's total research-related expenditures in the state of Texas for Fiscal year 2010-11 were close to $33.2 million; expenditures in El Paso County accounted for approximately $29.1 million of this total, while the expenditure amount in the rest of Texas amounted to almost $4.1 million dollars. It should be noted that the bulk of research expenditures in El Paso is attributable to payroll expenses. In the rest of Texas, expenses other than payroll make up the bulk of research-related expenditures. A summary of these data is presented in Table 1 below.

Table 1. UTEP Research Expenditures FY 2010-11

	El Paso	***Rest of Texas***
Research Expenditures	$9,436	$2,489
Payroll (Including benefits)	$19,633	$1,607
Total	**$29,069**	**$4,096**

All dollar amounts are reported in thousands of 2011dollars

Economic Impact Findings

Impact on the State of Texas

The economic impact results of UTEP research activities in the State of Texas are presented in Table 2. Research expenditures in Texas for Fiscal Year 2010-11 amount to approximately $33.2 million dollars.[9] These research expenditures generate nearly $55 million of output in the State. That is, for every dollar spent on research, an additional $0.67 of indirect and induced output is generated in Texas. Moreover, UTEP's research endeavors support 740 jobs; of these, 544 are a direct cause of the research expenses, 37 correspond to supplier industries, and 159 jobs are a result of increased household spending. In addition, close to $32 million dollars are generated in labor income.

Table 2. Total Impact of UTEP Research on the State of Texas (FY 2010-11)

	Direct	Indirect	Induced	Total
Employment	544	37	159	740
Labor Income	$25,403	$1,195	$5,367	$31,965
Output	$32,840	$5,090	$17,038	$54,969

All dollar amounts are reported in thousands of 2012 dollars

Impact on El Paso County

The economic impact results of UTEP research activities in El Paso County are presented in Table 3. As previously mentioned, total research expenditures in El Paso amount to slightly over $29 million. Correspondingly, it is estimated that these expenditures increased local output by about $48.3 million. Over $4 million represented increased sales of supplier industries, and approximately $15.2 million represented increased household spending. In other words, for every dollar spent on research activities at UTEP, an additional $0.68 were generated within El Paso County. With respect to employment, it is estimated that research endeavors at UTEP employ 499 individuals directly, while 31 jobs are supported by supplier industries, and 145 are supported through increased household spending, mostly in service industries. In terms of wages, including benefits, UTEP's research activities generate approximately $28.8 million dollars; every dollar of direct labor income generates $0.25 in indirect and induced income in El Paso County.

[9] Given that a substantial amount of expenditures were assumed to have occurred in the wholesale trade sector, the total amount of expenditures (direct effects) are lowered by the IMPAN model by applying a margin estimated as sales less cost of goods sold. For more information see Minnesota IMPLAN Group, Inc. Glossary. Retrieved March 26, 2012 from IMPLAN.com Economic Impact Modeling Solutions: http://implan.com/v3/index.php?option=com_glossary&id=122

Table 3. Total Impact of UTEP Research on El Paso County (FY 2010-11)

	Direct	Indirect	Induced	Total
Employment	499	31	145	676
Labor Income	$23,107	$931	$4,769	$28,808
Output	$28,783	$4,323	$15,151	$48,257

All dollar amounts are reported in thousands of 2012 dollars

Impact on the rest of Texas

In the rest of the State of Texas, research expenditures totaled approximately $4.1 million. It is estimated that these expenditures generate about $6.7 million dollars in business volume. Of these, $767 thousand are attributed to increased sales of supplier industries, while close to $1.9 million represent increased household spending. Accordingly, for every dollar spent on research activities in Texas, an additional $0.65 is generated in the state. In terms of employment, UTEP research expenditures support 64 jobs outside El Paso County. Forty-five jobs are a direct result of research expenditures, 19 jobs are generated indirectly, meaning they correspond to jobs supported by supplier industries, while increased household spending generates 14 jobs. With respect to employee compensation, about $3.2 million dollars in wages, including benefits and proprietors' income, are generated in the rest of state of Texas; of these, $264 thousand are paid to workers in supplier industries, and $597 thousand are a result of increases in household spending.

Table 4. Total Impact of UTEP Research on the Rest of Texas (FY 2010-11)

	Direct	Indirect	Induced	Total
Employment	45	5	14	64
Labor Income	$2,295	$264	$597	$3,156
Output	$4,058	$767	$1,887	$6,712

All dollar amounts are reported in thousands of 2012 dollars

Conclusion

There is no doubt that research activities at The University of Texas at El Paso have a positive impact on the state's, and more specifically, El Paso County's economy. These activities support 676 jobs in El Paso, and 64 jobs in the rest of Texas. Accordingly, almost $55 million are generated as output in Texas. With UTEP's plan to reach Tier One status, it would seem logical that the economic impact of UTEP's research activities will increase in the next few years.