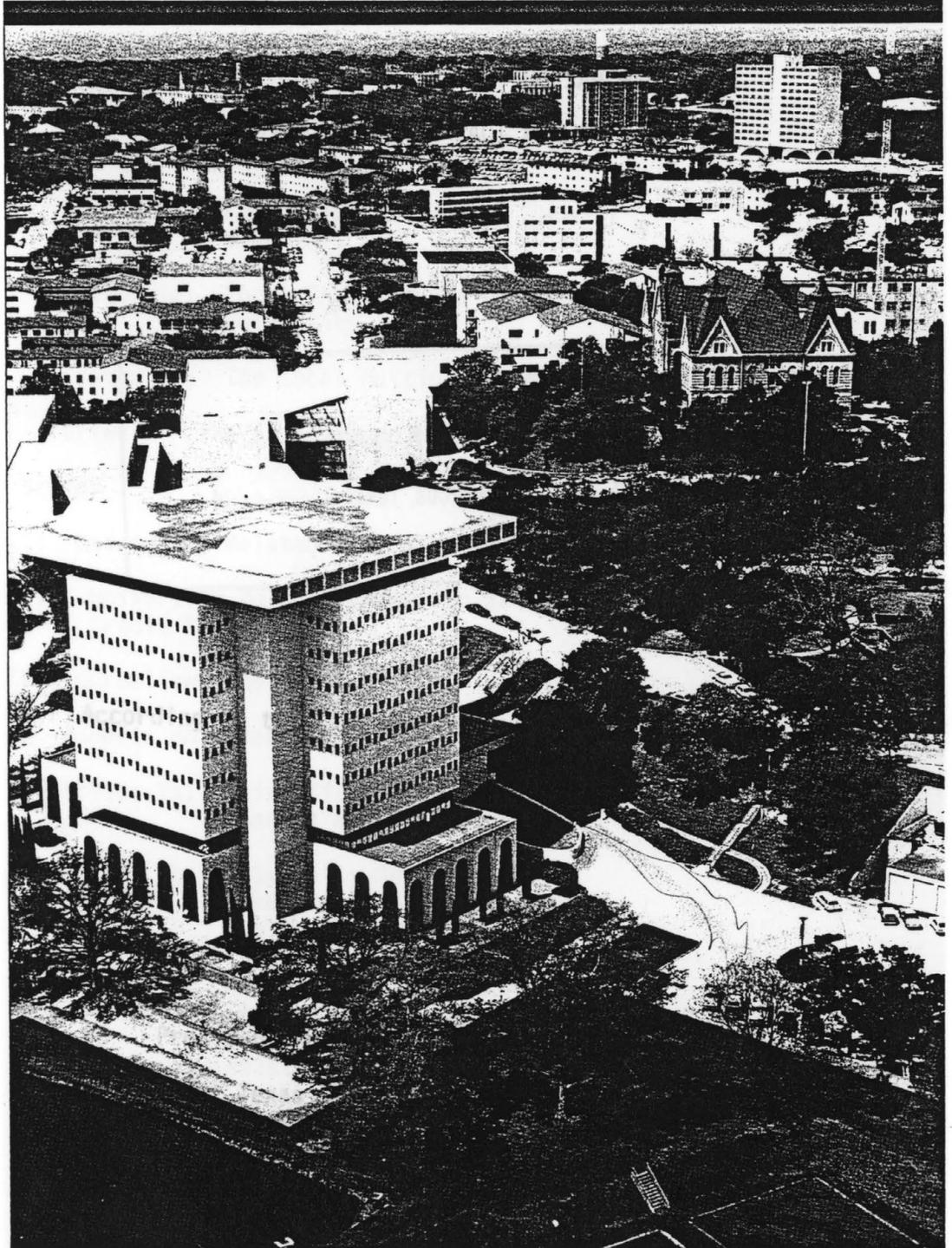
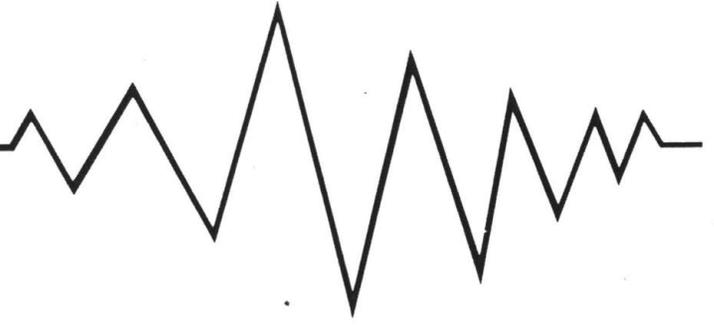


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an economic impact analysis



Highlights of Findings

SOUTHWEST TEXAS STATE UNIVERSITY AND THE SAN MARCOS
COMMUNITY: AN ECONOMIC IMPACT ANALYSIS

Conducted in 1985
According to the Caffrey-Isaacs Model

for
President Robert Hardesty
Southwest Texas State University

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INTRODUCTION

The university and the community in which it is located are interacting members of a dynamic social drama in which conflict appears inevitable. The university views itself not only as an instrument of public service through its vast output of teaching, research, social and cultural contributions, but also as a direct and indirect generator of large economic gains for the population of the local community. Admittedly though, these positive impacts are counterbalanced to a degree by the negative effects of the implications of tax exempt property and the value of social services provided to the university community by local government. And the conflict appears to intensify as the university grows, especially if it is already large relative to its urban area environment.

The non-university population is especially conscious of the problems the university, with its young, fluid population, imposes on the city, and of the necessity to provide the regular array of city services required to meet the needs of the university population. The revenues which are necessary to pay for the provision of these services must, however, come from sources other than real estate taxes on the land and physical plant of the university. Private universities are usually non-profit and real estate tax exempt. State universities are exempt from real property taxes by law.

The university community tends to focus on its economic contribution to the locality. It has a substantial payroll; is a major employer

in the community; is indirectly responsible for many jobs; serves as a vast interregional transfer mechanism through which private, state, and federal funds flow into the local economy; provides stability to the local economy during economic fluctuations; and through its presence creates a community image that makes the area attractive to other kinds of economic enterprise. Many of the faculty, staff, and students are local residents. There is no substantial difference between the university citizen and any other citizen, except for the inability of local government to impose taxes on the university citizens' place of work.

There are two sides to the issue. Universities may pose special problems while simultaneously offering unique opportunities for the communities in which they are located. The university itself does not provide real property tax revenue, but the university community (faculty/staff and students) does, on the other hand, contribute significantly to the general economic well-being and to the tax revenues of the area in which it is located. A substantial part of the university's payroll is spent locally, the university purchases many items locally, and students patronize local businesses.

In fact, a university is what an economist would define as a basic industry. This type of industry markets its product outside its location, and in turn, is linked to the local markets through the expenditure patterns it generates. University funding is derived primarily from statewide taxes and student fees. A large portion of these funds are expended in the local area. Most student expenditures are also made with funds received from outside of the local area. Income

earned across the state and nation is spent by students in the university area. These expenditures provide income to local residents directly and provide for further income expansion through secondary and tertiary expenditures.

Tax revenues are generated at the local level by faculty/staff and students who own and rent locally. There is a further contribution to local tax revenues from the real property taxes paid by businesses that are dependent to some degree on the university community. What is generally lacking in the university-city picture is a reasonably accurate assessment of the magnitudes of university-related expenditures and contributions.

The primary goal of this research is to explain in an objective fashion the cash-flow impact of Southwest Texas State University on the San Marcos community. An assessment of cash-flow contributions and costs leaves many questions about the university's impact unanswered. Any industry has a greater influence on the area in which it is located than can be specified by a cash-flow analysis. The education industry as represented by a university is no exception. The university, in fulfilling its educational role, brings a group of highly trained individuals together with a larger group of intelligent, mostly young, people. The former take a large and active role in the area's educational, cultural, and social activities while the latter provide, among other things, a significant source of part-time employees for local business establishments. This mixture unquestionably contributes to the overall character of the locality and enhances the desirability of the community as a place to live. Certainly the university's presence is a positive

influence on economic development, but even more important is the role the university plays in stabilizing the local economy. Since the university is not as vulnerable to economic fluctuations as most other industries, the city is spared the periodic instability associated with business recessions that coincide with the national economy.

THE MODEL, DATA, AND MODEL RESULTS

Many of the economic costs and some of the benefits are readily observed in the local scene. A more precise measure of these costs and benefits than is offered by casual observation is desirable. A model developed by John Caffery and Herbert H. Isaacs, Estimating the Impact of a College or University on the Local Economy, for the American Council on Education was selected and modified, where necessary, for the purpose of this study.¹ This model has been applied in similar situations across the United States and its power as a research tool has been demonstrated by its acceptance as the model of preference for conducting economic impact analyses of universities on their local communities.

In general this model allows the research to proceed by economic sectors (a description of the Caffrey-Isaacs model and the San Marcos model is presented in Appendix A).

The economic sectors contained in the model are as follows: Sector I gives the university-related expenditures impact on local businesses. The expenditures estimated are the expenditures of university visitors, university students, university faculty/staff, and the university itself. This sector also estimates the local multiplier and gives the probable multiplier effect on the expenditures identified above. Sector II estimates the level of business investment which is dedicated to university-related business volume. Sector III addresses the university related-expansion of the local credit base. Sector IV considers the business volume foregone as a result of university-operated businesses. Sector V estimates the government revenue

which can be attributed to university-related activity. This sector considers fees, fines, and intergovernmental transfers. Sector VI estimates the tax revenue generated from university related economic activity. This estimate includes sales taxes, and all property taxes. Sector VII identifies the costs to the local governing units to provide government services to the university-related population. Costs associated with the city, schools and county are included. Sector VIII allocates the local government capital stock between university-related capital needs and non-university related capital needs. Sector IX estimates the real estate taxes foregone by the local governments due to the presence and tax-exempt status of the university. Sector X reports the value of services which the university provides for itself thereby reducing the city and county service burden. Section XI estimates the university-related economic impact on local individuals. The impacts considered are job and income creation. The final section, Section XII estimates durable goods purchased from university-generated income.

Sector I

UNIVERSITY-RELATED LOCAL BUSINESS VOLUME

This first sector is the estimate of the local business impact of the university. The business sector of the Southwest Texas-San Marcos model is titled "University Expenditures." University expenditures are in turn divided into sub-sectors. The data sources and model results for each sub-sector follow.

Sector IA

LOCAL EXPENDITURES BY UNIVERSITY-RELATED VISITORS

The university is a center for various athletic and academic activities. These activities bring visitors to San Marcos from various geographic localities outside the city. Examples of the university activities which produce out-of-town visitors are athletic events, university workshops, university recruitment, book salesmen, etc. Other university-related visitors who come to San Marcos are the relatives and friends of the faculty/staff and resident students. The expenditures of all university-related visitors for food, lodging, gasoline, and incidentals are a part of the overall economic impact of the university on the San Marcos economy. The data to measure the magnitude of these expenditures were provided by questionnaires (Appendix B). Questionnaires were sent to a sample of all students, the entire faculty/staff, all administrators, university support services, and academic departments at the university (student sample size, confidence levels, and level of statistical precision are contained in Appendix C). The expenditure levels derived from the surveys are presented as Table 1.

TABLE 1
University-Related Visitor Expenditures
with Local Businesses FY 1984

Departmental Visitor Expenditures	\$10,962,433
Faculty and Staff Visitor Expenditures	355,956
Student Visitor Expenditures	1,844,509
Total Visitor Expenditures	<u>\$13,162,898</u>

Source: Questionnaires

University-related visitor expenditures amounted to \$13,162,898. University, faculty/staff, and visitor elements of the total above can also be noted from Table 1.

Sector Ib

EXPENDITURES BY STUDENTS

The magnitude of local student expenditures varies by the student's place of residence. The student sample questionnaire addressed this question. The student body was divided into three residence classes: (1) non-local students, (2) local non-dormitory resident students, and (3) local dormitory students. The size of each class of students was determined from the 1983-1984 Student Profile and University Fact Book of Southwest Texas State University. Total student expenditures were then calculated from the data obtained from the student questionnaires and the number of students per residence class. Total estimated student expenditures were \$52,440,426 in 1984; they are broken down by residence class in Table 2. As expected the major contributors to this total were the local non-dorm resident students. The expenditures for this class were about 77% of all student expenditures. Even if rental expenditures of \$12,895,627 for local non-dorm resident students are excluded, they are still the largest contributor to local student expenditures.

TABLE 2
Student Expenditures in the San Marcos Economy

Non-Local Students	\$ 5,919,487
Local Dormitory Students	6,217,481
Local Non-Dormitory Students	40,303,458*
Total Student Expenditures	\$52,440,426

*Includes rental payments of \$12,895,627
Source: Student Questionnaires

Sector Ic

LOCAL EXPENDITURES BY FACULTY AND STAFF

The faculty/staff questionnaire revealed that 59.3 percent of this group live in San Marcos. One-third of this group rents housing while the remaining two-thirds are home owners. The average monthly rental payment by faculty/staff for the renter group was \$327.82. The total local contribution to rental income by faculty/staff tenants was \$1,228,450. Combined faculty/staff non-housing expenditures were \$15,587,134.

Sector Id

LOCAL EXPENDITURES BY THE UNIVERSITY

In Texas the pattern of purchases by the university is largely determined by legislative laws, rules, and regulations. There are, however, areas of university discretion and in many cases local purchases can be made which conform to state mandated rules. Data from the purchasing office indicate that the university expended \$7,966,019 on local purchases in 1984.

Sector Ie

THE LOCAL MULTIPLIER EFFECTS-
THE EXPENDITURE MULTIPLIER

Initial expenditures to determine final demand are multiplied within an economy as money passes from hand to hand. This phenomenon, known as the multiplier effect, causes the economic impact to be larger than the original expenditure. The difference between initial expenditures and actual economic impact is dependent upon the size of the

multiplier. A small open economy such as San Marcos is generally characterized by a small multiplier since outside purchases represent leakages that reduce the final economic impact of an initial expenditure.²

While other universities in Texas (UT-Austin and Baylor, for example) typically use multipliers in excess of two in assessing the economic impact, the multiplier for San Marcos was computed to be 1.68 (Appendix D). This number implies that a dollar expended locally will generate an additional \$0.68. The San Marcos multiplier was computed on the basis of the state multipliers from the Texas Water Resources Board and employment by sector in San Marcos.

The relatively low multiplier was as expected. The openness of the San Marcos economy and lack of economic integration dictated the multiplier size.

The purchasing multiplier was computed from the same data and in the same manner. The degree of openness in the San Marcos economy and the lack of economic integration can also be noted here. Local businesses, as a group, purchase locally 2 percent of the goods and services sold locally. The economic impact arises through household expenditures.

The economic impact of secondary and tertiary expenditures was, given the multiplier size, still impressive. The additional business volume generated was \$62,968,210.

Summary of Section I

The direct university-related expenditures, the derived expenditures, and the resulting university related business volume reported in Table 3, support the university community contention of a substantial economic contribution to local business volume. The total level of business volume, \$152,686,965, represents 46.5 percent of all business volume in San Marcos. It would require substantial industrial development to provide an impact of this magnitude.

TABLE 3
Direct University Related Expenditures
Derived Expenditures and Total University
Related Business Volume, San Marcos, TX FY 1984

Direct Expenditures (Visitors, Faculty/staff, Students, and University)	\$89,718,754
Derived Expenditures	62,968,211
Total University Related Business Volume	\$152,686,965

Source: Questionnaires and derived multiplier

Sector II

UNIVERSITY-RELATED BUSINESS INVESTMENT

Business volume generates related business investment in inventory, furniture, fixtures, and structures. These real investments in turn generate a local tax base. University-related business volume, therefore, generates a real property tax base for local government. Taxes assessed and collected from this base defray some of the cost of government services to the university community. This sector of the model estimates the local tax revenue from this tax base.

The local business community does not, of course, set aside a portion of its real asset investments as being dedicated to university

business. It is necessary, therefore, to devise a procedure to compute this value. The procedure used in this model is described as follows.

Local business volume for 1984 was obtained from the Texas State Comptroller's Office. Then data as to the value of the total local inventory, furniture, fixtures, and buildings, were collected and the ratio of university-related business volume to total business volume was applied to these data.

The assessed value of all business investment was reported as \$200,304,709 in buildings and \$68,885,757 in other property. The ratio of university-related business (\$152,686,965) to all local business (\$329,806,381) was 46.3 percent. Thus, the property dedicated to university-related business was \$121,438,097. (See Appendix A for further calculations).

Sector III

UNIVERSITY-RELATED EXPANSION OF THE LOCAL CREDIT BASE

Another economic sector which is benefitted by the university's presence is the local financial sector. The university, faculty/staff, students, and a portion of local business deposits are attributable to the university's presence in San Marcos. These deposits are accompanied by reserves which allow local financial institutions to expand credit locally and elsewhere.

The average deposits of the university-related group are presented as Table 4. The university deposit was obtained from the SWTSU financial office. Students and faculty/staff deposits were obtained

from questionnaires and the related business deposits were computed from a ratio of cash on hand to business volume (see Appendix A). The total value of these combined deposits was \$28,337,888.

TABLE 4
University Related Expansion
of the Local Credit Base (Average Deposits)

University	\$16,000,000
Faculty/Staff	1,814,652
Students	2,168,184
University-Related Portion of Business Deposits	8,355,052
Total	\$28,337,888

Source: University Financial Office, Faculty/Staff
and Student Questionnaires

Given that there is a deposit reserve requirement, not all of the reserves generated by these deposits are available for credit base expansion. Using reserve requirements information obtained from the Federal Reserve Bank in Dallas and applying the reserve ratio to the level of reserves that accompany university-related deposits, a credit expansion of \$27,487,751 by local financial institutions is possible. If total credit expansion occurs, and the desired net bank spread of 2.5 percent to 3 percent is achieved, university-related financial activity generates from \$687,194 to \$824,633 in net income to local financial institutions.

Sector IV

UNREALIZED BUSINESS

University, faculty/staff, and student expenditures do enter into the flow of business in San Marcos. There are, however, some university activities which are quasi-business and possibly compete

with local business. The university activities which are of this nature are primarily the university book store and dormitories. If the university did not operate these enterprises, the students, faculty/staff, and university expenditures for those items provided by the university would enhance the overall volume of business.

The absolute level of enhancement would be \$6,910,645. On a relative basis this is about 2 percent of total local business volume. This relative value leads to the conclusion that the competition between the quasi-business operations of the university and the local business community is minor.

Sector V

IMPACTS ON GOVERNMENT REVENUES

In addition to the previously-mentioned contributions that students and faculty/staff make to the volume of business in the local community, they also pay fees, fines, and taxes directly. They also are responsible for some revenues to the city indirectly. This sector of the model addresses these phenomena.

Sector Va

UNIVERSITY-RELATED FEES, USER CHARGES AND TRAFFIC FINES

This sub-sector assesses the estimated revenues that are generated for local governments from the university community through the payment of automobile registration fees, user charges for utilities, and traffic fines. The absolute amount of expenditures and the components of the expenditures are presented as Table 5.

TABLE 5
Miscellaneous Local Revenues to
Local Government from University
Community Payment of Fees, Fines, etc. 1984

Automobile Registration	\$ 24,659
Traffic Fines	52,276
Utility Usage Fees	386,023
Total	<u>\$ 462,958</u>

Source: Estimates from number of student autos, faculty autos, etc. Student and Faculty/staff questionnaires and total traffic fines (See Appendix A).

The contribution from the sources above to the local government was substantial. The total contribution was \$462,958. The main contribution, \$386,023, was in the form of utility use fees. Traffic fines and auto registration fees contributed to a lesser degree.

Sector Vb

UNIVERSITY-RELATED INTERGOVERNMENTAL TRANSFERS FOR PUBLIC SCHOOLS

State money is allocated to local schools on the basis of a formula applied to head count. The State funds that are generated by university-related school children are the ratio of their number to total school enrollment. This ratio, when applied to total state aid to the local school district, provides an estimate of \$768,971 in state aid for 462 university-related children enrolled in local public school. The number of faculty/staff and student school children was derived from questionnaires. The total number of children in school was obtained from the local district, and state aid was obtained from the school budget.

Sector Vc

OTHER UNIVERSITY-RELATED INTERGOVERNMENTAL TRANSFERS

This sub-sector divides the flow of intergovernmental funds between the university-related group and the non-university related group. The amount of university-related funds was computed by applying the ratio of local university residents to all residents to total intergovernmental payments from the local government budgets. The amount of funds attributable to the university was \$69,518.

Sector VI

UNIVERSITY-RELATED TAX REVENUE

This sector estimates the tax revenue paid and generated by the university community. The taxes estimated in this sector consist of: (1) sales taxes, (2) property taxes on inventory, and (3) real estate taxes.

Sector VIa

UNIVERSITY-RELATED SALES TAX REVENUE

The city receives a portion (1 percent) of the general sales tax assessed in the city. The city also receives a portion of the mixed-drink tax and the hotel tax. In addition to these taxes the city also receives franchise taxes from utilities, etc., which are assessed on gross sales. The university-generated amounts of these taxes and the total are given in Table 6.

TABLE 6
University-Related Sales Taxes
Paid to the Local Government (1984)

General Sales Tax	\$710,263
Mixed Drink Tax	26,824
Hotel Tax	77,781
Franchise Tax	346,626
Total University-Related Sales Tax	<u>\$1,161,824</u>

Source: Calculated from the city budget and Table 3, and data provided by Texas Comptrollers Office (Appendix A)

The university community made a contribution of \$1,161,824 in sales taxes in San Marcos. The main contributors were the general sales tax, \$710,263, and franchise taxes, \$346,626.

Sector VIb

UNIVERSITY-RELATED NON-REAL PROPERTY TAXES

Businesses hold inventory in relation to total business volume. The university contributes to overall business volume in the local area and thus a portion of this inventory is made necessary by university-related business volume.

All inventory is subject to taxation, therefore some of the revenue generated by inventory taxes is attributable to university-related business volume. Government revenues generated by taxes on inventory amounted to \$146,396 in the local area in 1984. This estimate was derived by applying the ratio of university-related business volume to the total inventory value assessed by the central appraising district, and multiplying the product by an average tax rate.

The assessment was obtained from the central appraisal district and the individual taxing entity rates from the various financial reports and budgets of the county, school, and city (see Appendix A).

Sector VIc

UNIVERSITY-RELATED REAL ESTATE TAXES

Local governments also receive real estate taxes from university-related activity. A large percentage of faculty/staff and some students own their places of residence and pay real estate taxes directly. Other faculty/staff and students pay taxes indirectly through the payment of rent. The entire university community pays taxes indirectly on business real estate when it patronizes local business establishments. This sub-sector provides information as to the extent of these payments.

The university-related tax on business real estate was estimated in the same manner and subject to the same tax rate as inventories. This estimation includes the tax on such diverse business establishments as retail outlets of all types and rental units. The total tax paid by the university community indirectly through business was estimated to be \$472,938.

The amount of student and faculty/staff real estate payments paid directly was obtained from the sample survey data. The direct real estate taxes of faculty/staff and students were estimated to be \$761,213 and \$279,740 respectively.

Summary of Sector V and Sector VI

Sectors V and VI specify local government revenues received as a result of the university's presence in the local area. These revenues are paid directly and indirectly through business volume generated by the university, faculty/staff, and students.

Sector V accounts for intergovernmental funding from all sources and also accounts for fines, fees, and other revenue sources. The intergovernmental revenues are estimated on the basis of population and head count. The fees and fines are also calculated on the basis of university population to total population.

Sector VI accounts for tax revenues. These revenues are calculated as those paid directly by the students and faculty/staff plus the business taxes derived indirectly by the university, faculty/staff, and student expenditures.

Sector VII

THE COST OF UNIVERSITY-RELATED GOVERNMENT SERVICES

Sectors I through V have presented the additional business and government receipts attributable to the university's presence in San Marcos. There are, of course, significant costs associated with supporting such a large population. Sector VII addresses this phenomenon.

Sector VIIa

UNIVERSITY-RELATED SCHOOL COSTS

University-related school children add to the cost of public school operation. This additional cost amounted to \$954,261 in 1984. The expense was computed by the simple method of applying average cost per student to the number of university-related public school students. The number of public school students was estimated from the sample data.

Sector VIIb

OTHER UNIVERSITY-RELATED LOCAL GOVERNMENT COSTS

In addition to the added cost to the locality of university-related public school children, the added population of students and faculty/staff require additional county and municipal expenditures. This sub-sector of the model estimates the magnitude of these costs. The costs in this sub-sector are assigned on the basis of average cost for the local resident university-related population and one-half of the non-local university population. The dorm students, the off-campus local resident students, the resident faculty, and resident staff households are therefore assigned full average municipal costs; the students and faculty/staff who commute are assigned one-half the average cost of a resident. The costs estimated by this method to the city and county were \$4,431,042. The total costs incurred by the university population for all municipal and school services were \$5,385,303.

Sector VIII

GOVERNMENTAL CAPITAL ALLOCABLE TO THE UNIVERSITY

In addition to the need for current expenditures for ongoing services, the local municipality, county, and school district are required to make added capital expenditures to accommodate the population. These expenditures must increase to accommodate growth. The model does not address the incremental costs of growth. The model merely assigns a portion of the existing capital structure to the university population. The assignment is done on the same basis as the current budget assignments above. The result of this procedure is a total governmental property value dedication of \$6,155,924 which consists of municipal property value dedication of \$5,233,177 and school property dedication of \$922,747.

Sector IX

REAL-ESTATE TAXES FOREGONE

This sector of the study assesses the value of tax revenues foregone due to the tax-exempt status of the university; the method used does not consider the taxable value of university structures. The value assigned is the value of the land itself in alternative uses. This assessment involves the assumption that in the absence of the university the university-occupied land would have developed as the balance of the city has developed.

The university occupies 362 acres or 3.76 percent of the total acreage in the taxing district. Total property taxes in the district were \$6,963,746. If this value is expanded by 3.76 percent, tax revenues would increase to \$7,225,627. Thus, tax revenues foregone are \$261,882.

Sector X

SELF-PROVIDED MUNICIPAL SERVICES

The university does provide some of its own services. These services can be looked upon as a reduction in the local burden of the university. The primary university services which fall under this general heading are university police services and trash collection. The value of these self-provided university services was \$559,625 in 1984.

Sector XI

IMPACT ON INDIVIDUALS

When an area is soliciting industry, the importance of the prospective industry is often couched in terms of employment; i.e., how many jobs will the industry create directly and indirectly. Sector XI provides information on university-related job creation and personal income.

Each dollar of total business volume is responsible for some percent of a job. The ratio of jobs to dollars of total business volume was computed (see Appendix A) and applied to total university-related business volume. The calculation estimates the number of jobs in the area that are the result of the university's presence. The number of additional jobs was computed to be 4,639, or about 46.8 percent

of all jobs within the city.

Industrial development also raises questions regarding its impact on personal income because business volume and jobs generate income. The ratio of personal income (earned income) to total expenditures was calculated from the expenditure data described above. Earned income was obtained from the U.S. Office of Business and Economic Research. The ratio of these data was applied to the university-related business volume. The amount derived was added to the university payroll. This procedure estimates the amount of personal income generated to be \$73,151,686.

Sector XII

DURABLE GOODS PROCURED WITH UNIVERSITY-GENERATED INCOME

The extent of durable goods purchases was computed more as a matter of interest, than as an integral part of the impact of the university. It is a sector in the Caffrey-Isaacs model and was computed for the San Marcos Model.

The amount of durable goods purchased with university-related income is estimated to be \$2,150,660. The amount is 2.94 percent of the university-generated personal income.

SUMMARY AND CONCLUSION

In conclusion, Southwest Texas State University provides major benefits to the San Marcos community; it also requires that local governments dedicate a portion of their budgets and capital expenditures to provide services to the university community. Whether or not the cost incurred is deemed to be excessive is still a matter of perspective. The primary function of a university is to develop people. It is much more than a business that hires people, buys goods, and pays or does not pay the tax liability usually associated with businesses. It is a cultural element in the local community, inevitably effecting the lives of people who come in contact with it. Local citizens can attend classes, concerts, athletic events, and in general enjoy social contracts they might not have in the absence of a university.

The university and its related community are responsible, directly and indirectly, for \$152,686,965 in business volume. This represents 46 percent of all business volume in the area. This business volume along with the university payroll and employment accounts for over \$73 million in personal income and 4,639 jobs. It is unlikely that San Marcos could attract a new industry which would have an impact of this magnitude.

There is also a university-related contribution to the local financial community. It is probable that the university contributes very little to loan demand in the area. It did, however, contribute substantially to the credit base. The potential expansion of the credit base amounted to \$27,529,200 in 1984. If this credit base was utilized it was surely of benefit to the local financial community.

In addition to the added volume of business, jobs, and income, the university community is also responsible for a substantial flow of revenues to the local governing units. The lack of payment of real estate taxes by the university does not imply a lack of payment to local government units. The payment of sales taxes, university-related business taxes, student, and faculty/staff real property taxes, population related intergovernmental transfers, fines and fees all add to the local government revenue stream. The research indicates that these sources of revenue added \$4,123,559 to the resources of the local governments. Tax revenue foregone because of the tax-exempt status of the land upon which the university is located was estimated to be \$261,882.

The major cost to the locality is the expenditure for city and other local governmental services necessary to support the university population. The model used in the research makes no distinction between groups within the local population; costs are assigned on a per-head basis. This method of assigning costs is an obvious deficiency of the model. For example, it is unlikely that university students make use of the local public library given the availability of the university's library. Nevertheless, the cost of operating the local library is allocated on the basis of ratio of university population to the total population of the local community. Given this basis, i.e., allocating costs to the local community in proportion to population sub-groups (university vis-a-vis non-university) and working from average costs rather than marginal or incremental costs, the estimated cost to the city of providing local government goods and services to the university population was \$5,385,303 in 1984.

A portion of the public capital is also dedicated to support the university-related population. The dollar value of this governmental property was estimated to be \$6,155,924. Annual amortization costs of this public capital are captured in the previously-mentioned cost of local government goods and services provided to the university.

This study clearly indicates that the university is a vast inter-regional transfer mechanism through which private, state, and federal funds flow into the local economy. SWTSU is the largest employer in the city and is responsible indirectly for many more job opportunities. The university, since it is not as vulnerable to economic fluctuations as most other industries, is an extremely important stabilizing force in the local economy. Furthermore, SWTSU attracts employees who undertake a large and active role in the area's educational, cultural, and social activities, and the university's presence creates a community image that makes the area attractive to other kinds of economic enterprise.

The community and university have many interests in common, and in spite of the conflicts, are mutually supportive and interdependent. Hopefully, this research will contribute to a better understanding of the interdependent roles of the university and community.

Footnotes

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

² The degree of openness in an economy is a function of the size of the economy and the level of economic integration within the economy. The world is a closed economic system, the U.S. is a relatively closed system, Texas is a relatively open economic system and San Marcos is an almost totally open system. Most of the products and even services which are used in San Marcos are imported from outside the area. Thus, the interaction between local industries is minimal.

Appendix A

The Caffrey Isaacs Model, The Southwest Texas State
University Model and a Description of the San
Marcos-Southwest Texas State
University Variables

THE CAFFREY-ISAACS MODEL

- B-1. College-Related Local Business Volume
 - B-1.1. College-Related Local Expenditures
 - B-1.1.1. Local Expenditures by the College
 - B-1.1.2. Local Expenditures by the Faculty and Staff
 - B-1.1.2.1. Expenditures by Faculty and Staff for Local Rental Housing
 - B-1.1.2.2. Local Nonhousing Expenditures by Local Faculty and Staff
 - B-1.1.2.3. Local Expenditures by Nonlocal Faculty and Staff
 - B-1.1.3. Local Expenditures by Students
 - B-1.1.3.1. Local Miscellaneous Expenditures, Exclusive of Room and Board, by Students Obtaining Local Room and Board in Group Arrangements
 - B-1.1.3.2. Expenditures by Students for Local Rental Housing
 - B-1.1.3.3. Local Nonhousing Expenditures by Students Who Rent Housing
 - B-1.1.3.4. Local Expenditures by Nonlocal Students
 - B-1.1.3.5. Local Expenditures by Local Fraternities, Sororities, and other Student Groups
 - B-1.1.4. Local Expenditures by Visitors to the College
 - B-1.2. Purchases from Local Sources by Local Businesses In Support of Their College-Related Business Volume
 - B-1.3. Local Business Volume Stimulated by the Expenditure of College-Related Income by Local Individuals Other Than Faculty, Staff, or Students
- B-2. Value of Local Business Property Committed to College Related Business
 - B-2.1. Value of Local Business Real Property Committed to College-Related Business
 - B-2.2. Value of Local Business Inventory Committed to College-Related Business
 - B-2.3. Value of Local Business Property, Other Than Real Property and Inventory, Committed to College-Related Business
- B-3. Expansion of the Local Banks' Credit Base Resulting from College-Related Deposits
- B-4. Local Business Volume Unrealized because of the Existence of College Enterprises
- G-1. College-Related Revenues Received by Local Governments
 - G-1.1. College-Related Real-Estate Taxes Paid to Local Governments
 - G-1.1.1. Real-Estate Taxes Paid to Local Governments by the College
 - G-1.1.2. Real-Estate Taxes Paid to Local Governments by Local Faculty and Staff
 - G-1.1.3. Real-Estate Taxes Paid to Local Governments by Local Fraternities, Sororities, and Other Student Living Groups

- G-1.1.4. Real Estate Taxes Paid to Local Governments by Local Businesses for Real Property Allocable to College-Related Business
- G-1.2. College-Related Property Taxes, Other than Real Estate, Paid to Local Governments
 - no model Inventory and Other Nonreal-Property Taxes Paid to Local Governments by the College
 - G-1.2.1. Non-Real-Property Taxes Paid to Local Governments by Local Faculty and Staff
 - G-1.2.2. Nonreal-Property Taxes Paid to Local Governments by Local Fraternities, Sororities, and Other Student Living Groups
 - G-1.2.3. Inventory and Other Nonreal-Property Taxes Paid to Local Governments by Local Businesses for Assets Allocable to College-Related Business.
- G-1.3. Sales Tax Revenue Received by Local Governments as a Result of College-Related Local Purchases
- G-1.4. State Aid to Local Governments Allocable to the Presence of the College
 - G-1.4.1. State Aid to Local Public Schools Allocable to Children of College-Related Families
 - no model Other State Aid Received by Local Governments on a Per Capita, Service Unit, or Tax Unit basis and Influenced by the Presence of the College
- G-1.5. Other College-Related Revenues Collected by Local Governments
- G-2. Operating Cost of Local Government-Provided Municipal and Public School Services Allocable to College-Related Influences
 - G-2.1. Operating Cost of Government Provided Municipal Services Allocable to College-Related Influences
 - G-2.2. Operating Cost of Local Public Schools Allocable to College-Related Persons
- G-3. Value of Local Governments' Properties Allocable to College-Related Portion of Services Provided
- G-4. Real-Estate Taxes Foregone through the Tax-Exempt Status of the College
- G-5. Value of Municipal-Type Services Self-Provided by the College
- I-1. Number of Local Jobs Attributable to the Presence of the College
- I-2. Personal Income of Local Individuals from College-Related Jobs and Business Activities
- I-3. Durable Goods Procured with Income from College-Related Jobs and Business Activities

THE SOUTHWEST TEXAS STATE UNIVERSITY MODEL

- I. University Expenditures
 - A. University-Related Visitor Expenditures at San Marcos Businesses
 - B. Expenditures by Students
 - 1. Expenditures by Non-local Students
 - 2. Non-housing Expenditures by Renters
 - 3. Expenditures by Students for Rent
 - 4. Expenditures by Dorm Students
 - C. Expenditures by Faculty and Staff
 - 1. Local Expenditures by Faculty and Staff
 - 2. Expenditures by Faculty and Staff for Rent
 - D. Local Expenditures by the University
 - E. Multiplier Effects
 - 1. Spending Multiplier
 - 2. Purchasing Multiplier
- II. Property Committed to University Business
 - A. Other Property Committed to University
 - B. Value of Inventory Committed to University Business
 - C. Real Business Property Committed to University Business
- III. Expansion of the Local Credit Base
- IV. Local Business Unrealized Due to University Operations
- V. University Related Government Receipts
 - A. Total Other University Related Government Revenues
 - B. State Aid Allocable to University-Related Children
 - C. Other State Aid Received by Local Government
- VI. University Generated Revenues
 - A. Sales Tax Received due to the University
 - B. Inventory and Non-real Estate Taxes Paid Due to University Business
 - C. Real Estate Taxes
 - 1. Real Estate Taxes Paid by Business Due to University Business
 - 2. Real Estate Taxes Paid by Students
 - 3. Real Estate Taxes Paid by Faculty and Staff

- VII. Costs Associated with the University
 - A. University-Related Costs of Public Schools
 - B. Costs of Municipal Services Attributable to the University
- VIII. Value of Government Property Attributable to the University
- IX. Real-Estate Taxes Foregone Due to Tax Exempt Status
- X. Value of Self-Provided Services Provided by the University
- XI. Impact on Individuals in the Community
 - A. Number of Jobs Attributable to the University
 - B. Personal Income Attributable to Jobs and Business Activity Generated by the University
- XII. Durable Goods Procured with University Generated Income

THE SOUTHWEST TEXAS STATE UNIVERSITY ECONOMIC IMPACT MODEL

DESCRIPTION OF MODEL VARIABLES

SECTOR I: UNIVERSITY EXPENDITURES

SECTOR Ia: University Related Visitor Expenditures At San Marcos Businesses

The estimate of visitor expenditures was based on a departmental survey of all departments. The survey inquired about expenditures by visitors of university functions (excludes those not responding). The estimate also includes expenditures by visitors to students, faculty, and staff as reported on survey questionnaire. Departmental expenditures totaled \$13,162,898; expenditures by visitors to students, faculty and staff totaled \$2,200,465. These estimates are considered understated due to non-responses.

SECTOR Ib: Expenditures by Students Expenditures by non-local students

Calculated from survey questionnaire and based on Table 45 of 1983-84 Student Profile and University Fact Book. Average expenditure per non-local student \$955. Total number of non-local students was 6,198.

Non-Housing Expenditure by Renters

Amount spent per student, excluding housing, was \$4,188 taken from survey questionnaire. Number of local student renters, 6,545 based on student fact book.

Expenditures by Students for Rent

Average rental expenditures per student per year \$1,970 based on survey. Number of renters was 6,545.

Expenditures by Dorm Students

Average expenditure per dorm student per year was based on the student survey and estimated to be \$1,234. The number of dorm students based on fact book, table 49 was 5,038.

SECTOR Ic: Expenditures by Faculty and Staff Local Expenditure by Faculty/Staff

Total local non-housing expenditure was based on the survey and was determined to be \$15,587,134 per year.

Number of faculty and staff based on payroll records was 1,596. Percent of faculty/staff residing locally was 59.3 percent based on survey.

Total disposable income of faculty/staff was \$27,900,133 based on payroll records obtained from the University Payroll Office. The figure represents gross compensation less deductions.

Expenditures by faculty/staff for rent

Percent of local faculty/staff who rent housing was 33 percent based on survey. Amount paid for rent was based on percentage of total faculty/staff who rent locally times amount spent on rent. Percent of total faculty/staff who rent was 19.8 percent. Average amount each renter spent was \$327.82 per month.

SECTOR Id: Local Expenditures by the University

Total local expenditures were obtained from the university purchasing office.

SECTOR Ie: Multiplier Effects

Spending Multiplier

Estimate of the spending multiplier was calculated on the basis of research done by Texas Water Resources Board and Dr. V. Howard Savage.

Purchasing Multiplier

Estimate of the purchasing multiplier was calculated on the basis of research done by Texas Water Resources Board and Dr. V. Howard Savage.

SECTOR II: PROPERTY COMMITTED TO UNIVERSITY BUSINESS

Other Property Committed to University

This model calculates the value of property other than real and inventory that was dedicated to university business. No such "other" property was declared. The model includes an estimate of Local Business Volume and average business volume per firm which was used in subsequent models.

Local Business Volume was computed as follows: City of San Marcos sales were obtained from the office of the Comptroller of the State of Texas. These sales were \$313,734,307. The Model calls for Local Business Volume which would include sales volume plus rental incomes. Rental incomes were estimated as follows: The number of housing units was computed as total population (33,000) divided by household size (2.82). Number of housing units was estimated to be 11,702. The ratio of renter-occupied housing to all housing (based on 1980 census) was multiplied times total housing units (4,096) then multiplied by average annual rental payment of \$3,924 to derive a total rental income of \$16,072,074. Total local business volume was then estimated to be \$329,806,381.

The average business volume was computed as local business volume divided by number of local firms (808).

Value of Inventory Committed to University Business

The ratio of inventory to business volume was computed as value of commercial personal property (as reported by the Appraisal District, November 1984) divided by local Sales Volume (\$329,806,801).

Real Business Property Committed to University Business
Assessed valuation of local business property was obtained from
Central Appraisal District as \$200,304,709.

SECTOR III: EXPANSION OF THE LOCAL CREDIT BASE

Local Time-Deposit Reserve Requirement was obtained via phone conversation with Federal Reserve Bank in Dallas (3.0%). Average Time Deposit of University was obtained from Financial Vice President of SWT (\$12,800,000). Average time deposit of each faculty in bank obtained from survey (\$932). Average Time-Deposit of Students obtained from Survey (\$61). Number of Students total 17,772. Bank Deposit Reserve Deposit also obtained from Federal Reserve Bank (3.0%). Average demand Deposit of University was obtained from the Vice President of Finance SWT (\$3,200,000). Average Demand deposit of each faculty also obtained from survey as \$205. Average Demand deposit of each student obtained from survey as \$61.00. A cash to business volume ratio 5.5 percent was computed with data from the Federal Reserve Bulletin. San Marcos total deposits of \$112,600,000 (obtained from the Bank Red Book) were multiplied by the national ratio of demand deposits to all deposits then again times the ratio of business deposits to all demand deposits. The product of this calculation yields the amount of business demand deposits in San Marcos. The business volume ratio was then computed by dividing business demand deposits by total business volume in San Marcos.

SECTOR IV: LOCAL BUSINESS UNREALIZED DUE TO UNIVERSITY OPERATIONS

Business volume foregone by the city due to University operations include the University Bookstore with sales of \$2,339,668 and Dormitory rental receipts of \$4,570,977. University Bookstore sales were obtained from Office of Auxiliary Services at SWT. Dormitory rental receipts were based on average dorm rental payment (obtained from University Housing) multiplied by the number of dormitory students times the average number of months rented (obtained from survey data).

SECTOR Va: Total Other University Related Government Revenues

Other University related revenues which are distributed to local governments include automobile registration, user charges for utilities, and traffic fines.

Auto registration fees were computed on the following basis. The return to the county of automobile registration fees was divided by total number of automobiles in the county. The result of this calculation was then multiplied by ten percent of local student automobiles (total student autos equals 8,545) plus two automobiles per local faculty household.

The volume of utility user fees was computed from survey data using the average payment for water and sewage by local faculty, staff, and students.

The volume of university related traffic fines was computed by multiplying total traffic fine receipts times the ratio of university related population to total population in the city. The estimate was probably understated.

SECTOR Vb: State Aid Allocable to University-Related Children
Total number of children attending public school was obtained from San Marcos Independent School District Superintendent's Office as 4,772 students.

The number of faculty children in public school was obtained from survey data (462).

Total state aid to SMISD was obtained from the SMISD budget.

SECTOR Vc: Other State Aid Received By Local Government
Revenue sharing in 1984 totaled to \$187,486 which was multiplied by the ratio of local university-related population to total county population (37.1 percent).

SECTOR VI: UNIVERSITY GENERATED REVENUES

SECTOR VIa: Sales Tax Received Due to the University
Total sales taxes collected locally was \$2,509,559 which consisted of General Sales Tax (\$1,532,273), Franchise Tax (\$748,652), Mixed Drink Tax (\$59,110), Hotel Tax at 4% (\$143,164), and Hotel Tax at 3% (\$23,360). The total taxes received were then multiplied by the ratio of college-related business volume to local business volume.

SECTOR VIb: Inventory and Non-Real Estate Taxes Paid Due to University Business
The inventory tax rate was the property tax rate of .55 percent. The rate was taken as a total of the school tax rate of .80 percent plus the city tax rate of .68 percent plus the county tax rate of .165 percent divided by three to provide the average of .55 percent within the appraisal district.

Non-real Property Taxes were not applicable.

SECTOR VIc: Real Estate Taxes

Real Estate Taxes Paid by Business Due to University Business
The Real Estate Tax rate was the same as the property tax rate of .51 percent as computed in the previous model.

Real Estate Taxes Paid by Students
The total real estate taxes paid by students were taken from survey data using the average amount paid by each local student who paid local real estate taxes times the number of local off campus students.

Real Estate Taxes Paid by Faculty and Staff

The total real estate taxes paid by faculty and staff were taken from survey data.

SECTOR VII: COSTS ASSOCIATED WITH THE UNIVERSITY

SECTOR VIIa: University Related Costs of Public Schools

The local government budget for public schools was taken from the SMISD budget. The amount that was university related was computed by multiplying the total budget by the ratio of university related students to all students in San Marcos public schools.

SECTOR VIIb: Costs of Municipal Services Attributable to University

Total local daytime population was computed as the total of resident population (33,000) taken from the Chamber of Commerce) plus commuting students (6,198) plus non-resident faculty and staff (650).

The number of persons in local faculty households was computed as three times the number of local faculty and staff (three persons per household was taken from census bureau).

The number of persons in local student households (6,545) was taken from university records.

The Government Budget for all but public schools was computed as the county budget (\$4,913,262) less road and bridge expenditures multiplied by the ratio of city population to county population (80%) plus the city budget (\$8,421,028).

SECTOR VIII: VALUE OF GOVERNMENT PROPERTY ATTRIBUTED TO THE UNIVERSITY

The value of all city property (\$10,153,362) was taken from the 1984 Annual Financial Review for the City of San Marcos and added to the product of the county property times the ratio of city population to county population (80%).

The Value of Government Property associated with public schools was computed as the SMISD property value (\$11,821,873) multiplied by the ratio of property value in San Marcos to property in SMISD.

SECTOR IX: REAL-ESTATE TAXES FOREGONE DUE TO TAX EXEMPT STATUS

The geographic area of city (9,626 acres) was obtained from the City Engineer's Office. The geographic area of the university (362 acres) was obtained from university planning department.

Total Real Estate Taxes collected by government was computed as the total of city real estate taxes (\$3,162,253) plus School District Real Estate Taxes of (\$3,382,085) multiplied by the ratio of property value in San Marcos to property value in SMISD (83%) plus county real estate taxes (\$2,242,049) multiplied by the ratio of city property value to county property value (48%).

SECTOR X: VALUE OF SELF-PROVIDED SERVICES PROVIDED BY THE UNIVERSITY
The value of police and security services was obtained from University Police by telephone.

The value of trash collection services provided by the university was obtained from grounds maintenance by telephone.

SECTOR XI: IMPACT ON INDIVIDUALS IN THE COMMUNITY

Number of Jobs attributable to the University

The ratio of full time jobs per dollar of expenditure was computed as follows: the total number of jobs in San Marcos was computed as the number of jobs in Hays County (13,903), obtained from Texas Employment Commission) times the ratio of city population to county population. The total number of city jobs was computed to be 9,908. This value was divided by city sales volume (\$329,806,381) to provide a ratio of full time jobs per dollar of expenditure of .000032.

Personal Income Attributable to Jobs and Business Activity Generated by the University

Gross compensation of faculty and staff (\$35,485,722) was obtained from university payroll office.

Profit and payroll per dollar of expenditure was computed as follows: Total earned income (\$191,563,000) was obtained from the office of business and economic research. This number was divided by total expenditures.

SECTOR XII: DURABLE GOODS PROCURED WITH UNIVERSITY GENERATED INCOME

The percent of income used for purchase of durable goods was computed as durable sales obtained from county sales tax data, State Comptroller's Office (\$10,434,746) divided by total income in Hays county (\$354,684,000) obtained from the office of Business and Economic Research.

Appendix B

Survey Questionnaires

ECONOMIC IMPACT STUDY
Commuting Students

Please complete and return this questionnaire in the enclosed envelope by December 11, 1984.

1. What is your student classification?

() Freshman () Sophomore () Junior () Senior () Graduate

2. Indicate the number of months you attended SWTSU during 1984. ()

How many times during 1984 did parents or relatives from outside San Marcos visit you in San Marcos?

3. () number of visits

4. (\$) average amount they spent each visit

5. () total number of visitors during 1984

Approximately how much money per month do you spend in San Marcos on the following (exclude money spent at SWTSU):

6. Food and beverages purchased at grocery stores or convenience stores \$

7. Food and beverages purchased at eating and drinking places \$

8. Entertainment, recreation (exclude university activities) \$

9. Telephone \$

10. Clothing \$

11. Gasoline, auto maintenance \$

12. Misc. merchandise (such as tapes, records, stereos, etc.) \$

13. Services (such as hairdressers, barbers, photocopy) \$

14. Medical and dental expenditures (exclude university health service) \$

15. Other \$

16. TOTAL AMOUNT SPENT in San Marcos per month \$

17. If you purchased any major items not previously listed (such as automobiles, cycles, household appliances, furniture, recreation vehicles, etc.) in San Marcos during 1984, please indicate the total amount of these purchases.

\$

THANK YOU FOR YOUR COOPERATION

ECONOMIC IMPACT STUDY
Dorm Residents

Please complete and return this questionnaire in the enclosed envelope by December 11, 1984.

1. What is your student classification?
() Freshman () Sophomore () Junior () Senior () Graduate
 2. Indicate the number of months you have lived in San Marcos during 1984.

How many times during 1984 did parents or relatives from outside San Marcos visit you in San Marcos?
 3. () number of visits
 4. (\$) average amount they spent each visit
 5. () total number of people visiting during 1984
 6. Do you have a checking account in any institution in San Marcos?
() No () Yes 7. If Yes, average monthly balance \$
 8. Do you have a savings account in any institution in San Marcos?
() No () Yes 9. If Yes, average monthly balance \$
- Approximately how much money per month do you spend in San Marcos on the following (exclude money spent at SWTSU):
10. Food and beverages purchased at grocery stores or convenience stores \$
 11. Food and beverages purchased at eating and drinking places \$
 12. Entertainment, recreation (exclude university activities) \$
 13. Telephone \$
 14. Clothing \$
 15. Gasoline, auto maintenance \$
 16. Misc. merchandise (such as tapes, records, stereos, etc.) \$
 17. Services (such as hairdressers, barbers, photocopy) \$
 18. Medical and dental expenditures (exclude university health service)..... \$
 19. Insurance \$
 20. Service charges and interest paid to financial institutions \$
 21. Other \$
 22. TOTAL AMOUNT SPENT in San Marcos per month \$
 23. If you purchased any major items not previously listed (such as automobiles, cycles, household appliances, furniture, recreation vehicles, etc.) in San Marcos during the past 12 months, please indicate the total amount of these purchases.

\$

THANK YOU FOR YOUR COOPERATION

ECONOMIC IMPACT STUDY continued (oc)

How much money per month do you spend in San Marcos on the following (exclude money spent at SWISU)?

- 20. Entertainment, recreation (exclude university activities, include HBO, cable, movies, etc.) \$
- 21. Telephone \$
- 22. Clothing \$
- 23. Gasoline, auto maintenance \$
- 24. Misc. merchandise (such as tapes, records, stereos, etc.) \$
- 25. Services (such as hairdressers, barbers, photocopy) \$
- 26. Medical and dental expenditures (exclude university health service \$
- 27. Insurance \$
- 28. Service charges and interest paid to financial institutions \$
- 29. Other \$
- 30. TOTAL AMOUNT SPENT in San Marcos per Month \$
- 31. If you purchased any major items not previously listed (such as automobiles, cycles, household appliances, furniture, recreation vehicles, etc.) in San Marcos during 1984, please indicate the total amount of these purchases.

\$

THANK YOU FOR YOUR COOPERATION

ECONOMIC IMPACT STUDY continued (fs)

How much money per month do you spend in San Marcos on the following:

20. Water and sewage (if not included in rent) \$
21. Groceries purchased at food stores \$
22. Food and beverages purchased at eating and drinking places \$
23. Entertainment, recreation (exclude university activities, include HBO, cable, movies, etc.) \$
24. Telephone \$
25. Clothing \$
26. Gasoline, auto parts, auto dealers \$
27. General merchandise (housewares, toys, etc.) \$
28. Services (hairdressers, barbers, maid service, etc.) \$
29. Medical and dental expenditures \$
30. Insurance \$
31. Service charges and interest paid to financial institutions \$
32. Building materials (lumber, plumbing, etc.) \$
33. Furniture and appliances \$
34. Business services (accountants, lawyers, real estate agents, etc.) \$
35. Kindergarden and daycare services \$
36. Other \$
37. TOTAL AMOUNT SPENT in San Marcos per month \$

THANK YOU FOR YOUR COOPERATION

Department Finance and Economics

Handwritten signature

SWTSU VISITOR FORM

Activity or Event	Total Number of Visitors	Total Number of Nights per Visitor Spent in Hotels or Motels in San Marcos	Total Number of Meals Eaten per Visitor in San Marcos Restaurants			Other Expenditures per Visitor	
			Breakfast	Lunch	Dinner	Amount	Where
1. Faculty Recruitment	12	only 1 visitor spent the night	1		1	\$25	Lunch with departmental Faculty
2.							
3.							
4.							
5.							
6.	12	1	1		1	25	
7.							
8.		480			168		
9.							
10.							
11.							
12.							
13.							
14.							
15.							
16.							

Appendix C

Student Sample Size, Confidence Levels, and Level of
Statistical Precision of the Study

DETERMINATION OF THE STUDENT EXPENDITURE SAMPLE SIZE

As is often the case, resources were not available to sample the entire student population universe. It was necessary therefore to determine an acceptable sample size and to estimate the number of questionnaires to be mailed to elicit a return either equal to, or in excess of the derived number. The students were to be sampled on a stratified random basis. The strata were dorm students, local San Marcos non-dorm students, and computing students. The formula to determine the sample size is as follows:

$$n = \frac{N \sum N_h S_h^2}{N^2 D^2 + \sum N_h S_h^2}$$

where

n = sample size

N = Universe (total student population)

N_h = population per strata

S_h² = variance per strata

D² = d²/z²

d = level of precision

z = confidence level

Then of the sample n the proportions are: $nh = \frac{N_h}{N} \cdot n$

where again:

nh = sample proportion per strata

N_h = total population per strata

N = population (universe).

Further if n is less than 5% of N then the finite population correction need not be used.

It can be noted that the variance S_h² is called for in the process of determining the sample size. An estimate of this number was made by surveying selected classes of students in the School of Business. These surveys provided data which were used in the determination of the variance and the sample size. This procedure estimated the sample size to be about 350 students

A 25 percent response rate was estimated and 1500 questionnaires were mail

to students. Useable responses were received from 447 students. This was a response rate of 29.9 percent, which was in excess of the expected response rate. The strata break down was 107 commuting students, 162 dorm students, and 178 San Marcos non-dorm students.

This number was in excess of the estimated needed sample size. However, the pre-sample estimate of the sample variance was low and the additional responses were needed. The upshot is that dorm students and local non-dorm students were slightly oversampled. The commuting group were slightly under-sampled.

The sample results did however fit a generally accepted criterion. The confidence interval was plus or minus two standard deviations (95 percent) and the precision level was .05. In other words, we are 95 percent sure that the results conform to the population expenditure pattern plus or minus 5 percent.

Questionnaires were sent to each member of the faculty-staff, a total mailing of 1596 questionnaires. Four hundred and twenty usable questionnaires were returned. This is a 26.3 percent response rate. While this is a lower response rate than was desired, the results still fall into acceptable ranges as to the confidence interval and the level of precision.

Appendix D

The San Marcos Multiplier

The Multiplier Derivation

The most accurate information as to the magnitude of the local economy multiplier can be derived from the structural relationships in an input-output model. The problems that arise with the computation of the multiplier are directly connected to a lack of data which are necessary to construct the input-output model. The method whereby a matrix was estimated and the multipliers computed for the San Marcos economy is as follows. The Texas Input-Output Model 1979 provided the basic Input-Output (I-O) model. It was of course necessary to modify this model to fit the local area. The modification entailed a determination of the industrial structure of the San Marcos area. This determination was done through reference to "County Business Patterns," The City, County Data Book, and information as to income and income sources obtained from the Office of Business Economics of the U.S. Department of Commerce. If then it was determined that an industry was present in the San Marcos area that was specified in the Texas model, that row and column were left in the San Marcos model. Otherwise, that row and column were deleted. The result was a matrix of 31 rows and columns. The direct requirements in the rows and columns were further modified by applying employment location quotients to the relevant row coefficients in the Texas Model. This assumes that if the location quotient (LQ) is one or greater, that the sales to other industries in the local economy conform to Texas sales. If the LQ is less than one then only that portion of the industry output was available to the local economy and the balance was assumed to be imported.

The inverse of the matrix derived from the procedure above was then computed, and the column totals tabulated. The multipliers themselves are defined as being:

$$\frac{\Delta DD + \frac{FD + \Delta ID}{SV}}{\frac{\Delta FD}{SV}} = m$$

where

- Δ indicates change
- FD is final demand
- ID is intermediate demand
- SV is sales volume component change
- DD is consumption or derived demand.

The conditions of the equation above are fulfilled if the column totals of the $(I-A)^{-1}$ are summed.

The purchase multiplier or level of purchases is determined by adding the rows of the direct requirements coefficient matrix! This procedure gives direct sales from local industries to each other.

In general the I-O model is as follows:

If it is assumed that all industries are in equilibrium for the period of time, then the system becomes n linear equations in n unknowns. Thus the growth output of X_j in equilibrium is:

$$X_j = x_{j1} + x_{j2} + \dots + x_{jn} + Y_j, \tag{1}$$

where X_j sells its output to itself, other industries and final demand, Y_j . Then for industry j to produce X_j it will require a certain number of units of i . If it is assumed then that there are no economies of scale, the amount of i required by industry j is directly proportional to the output of industry j . The equation then for X_{ij} is:

$$X_{ij} = a_{ij}X_j, \quad (2)$$

where a_{ij} is the technical coefficient or the "constant of proportionality" which depends upon the technology of the j th industry. Then by substitution of (2) into (1),

$$X_i = a_{i1}X_1 + a_{i2}X_2 + \dots + a_{in}X_n + Y_i, \quad (3)$$

or

$$X_i - a_{i1}X_1 - a_{i2}X_2 - \dots - a_{in}X_n = Y_i, \quad (4)$$

which for each industry i yields a set of simultaneous equations.

Then by the assumption of constant production coefficients there are n equations in n unknowns. The unknowns being X_1, X_2, \dots, X_n . The values of the a_{ij} 's and Y 's must be determined from data gathered outside the model.

The n simultaneous equations in n unknowns can be solved through the use of matrix algebra. Given Equations (5), they can be arranged in matrix form as follows. Since total product is used by intermediate uses and final demand, then:

$$X_j = \sum_i C_{ji} + Y_j \quad (6)$$

where Y_j is equal to final demand and C_{ji} is equal to the intermediate uses and:

$$C_{ji} = a_{ij}X_j \quad (7)$$

Thus the intermediate demand for the output of the j th industry is equal to the production coefficient of the i th industry for the product of the j th industry multiplied by the total output of the j th industry. Then

$$X_j = \sum_i a_{ij}X_i + Y_j \quad (8)$$

for all j .

Then in matrix form:

$$X = AX + Y \quad (9)$$

where X is the column vector of outputs, A is the square matrix of technical coefficients and Y is the column vector or matrix of final demands. Providing $(I-A)$ is nonsingular, we can write Equation (9) as:

$$X - AX = Y \quad (10)$$

and, thus,

$$X = Y(I-A)^{-1} \quad (11)$$

where I is an nth order identity matrix. The solution to the vector of unknowns results from the multiplication of the final demand vector by the I-A inverse. If there are changes in the final demand matrix, the changes which will occur in the other sectors may be examined by exploring the elements of the inverse matrix in Equation (11).

The location quotient derivation of the LQ used to modify the selected Texas coefficients is as follows: A LQ is the ratio of two ratios thus:

$$LQ = \frac{\frac{E_{ism}}{E_{sm}}}{\frac{E_{iTx}}{E_{Tx}}}$$

where:

E_{ism} is employment in the ith industry in San Marcos, Texas.

E_{sm} is total employment in San Marcos, Texas.

E_{iTx} is employment in the ith industry in Texas.

E_{Tx} = total employment in Texas.

Texas was used as opposed to the more common use of the U.S. because the Texas model was the one to be modified.

The overall San Marcos multipliers were then computed as a weighted average of the various sector multipliers. The household sector was in each case considered endogenously. This is appropriate where the major impact of a local expenditure is transmitted to the balance of the economy through the household sector.

