

# THE ORIGINS OF ONGOING OPPORTUNITY: THE ECONOMIC BENEFITS OF HIGHER EDUCATION INSTITUTIONS IN THE DALLAS-FORT WORTH AREA

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## Summary of Key Results

- The Perryman Group estimates that when multiplier effects are considered, **ongoing operations** of Dallas-Fort Worth area higher education institutions generate a total annual increase in business activity in the Dallas-Fort Worth area of approximately **\$13.3 billion** in gross product each year and **193,921** jobs. Related student and visitor spending further increases these effects.
- Growing enrollments and changing needs lead to significant additional facilities on an ongoing basis, The Perryman Group estimates that, in a typical year, **construction projects** at Dallas-Fort Worth area higher education facilities lead to almost **\$600 million** in direct construction spending. When multiplier effects are considered, the gains in business activity in the region associated with construction projects include an estimated **\$924.5 million** in gross product and **10,541** person-years of employment in a typical year.
- The benefits of **research activity** are multifaceted.
  - Conducting research involves jobs for researchers and others as well as various operational expenses (which are included as part of the overall operational impacts of the facilities).
  - In addition, spinoff benefits such as commercialization of discoveries and royalties lead to additional gains; The Perryman Group estimates spinoff benefits from FY 2018 research (and the residual benefits from recent years) at Dallas-Fort Worth area higher education institutions include **\$3.4 billion** in gross product per year in the Dallas-Fort Worth area as well as **25,027** permanent jobs, based on typical patterns and including multiplier effects.
  - Even beyond these effects are societal benefits as new discoveries are disseminated. The Perryman Group estimates that the overall societal benefits of research at Dallas-Fort Worth area higher education institutions include **\$5.7 billion** in US gross product and **41,531** jobs.
- The Perryman Group estimates the incremental economic benefits of graduates of the Dallas-Fort Worth area's higher education institutions includes **\$67.4 billion** in gross product in the region each year and **654,982**

jobs when multiplier effects are considered. These graduates thus support about **15%** of total economic activity in the region.

- Economic activity generates additional taxes to the State and to local government entities. The Perryman Group estimates that fiscal benefits of operations, student spending, and visitor spending lead to increased tax receipts of some **\$879.0 million** to the State and **\$701.9 million** to local government entities (such as cities, counties, school districts, and special districts) in the Dallas-Fort Worth area each year.
- From the perspective of the competitiveness of a regional economy, higher education institutions provide a steady stream of graduates to fulfill the hiring needs of businesses. Corporations considering locations or expansions include the availability of excellent higher education opportunities as a decision criterion, and the institutions in the region represent an important competitive advantage.

## Introduction

A trained workforce is essential to growth in any economy. In the current environment of growing complexity in business operations of virtually all types, quality education is increasingly important from both the individual's and the employer's perspectives. Education at all levels is crucial to ongoing prosperity, and areas with a highly skilled workforce are more competitive in attracting quality corporate locations and expansions. Higher education is particularly crucial to future economic growth as well as personal financial success. In addition, the non-pecuniary benefits of a more active and informed citizenry, an enhanced cultural environment, and a more sustainable social structure are profound. All of these factors are particularly crucial to the Dallas-Fort Worth area, one of the most dynamic and diverse centers of economic activity in the world.

*Education at all levels is crucial to ongoing prosperity, and areas with a highly skilled workforce are more competitive in attracting quality corporate locations and expansions.*

Approximately 17 sizable institutions of higher education in the Dallas-Fort Worth area offer a wide variety of options to students for attaining the needed skills for future success, with many others also serving student needs.

*An outgrowth of providing advanced education is generating an economic stimulus with multiple dimensions.*

At the same time, these institutions are providing current and potential future employers with workers with needed skillsets

and setting the stage for even greater competitiveness and productivity in the future. Enrollment has grown significantly over time, enhancing the economic importance of the area's universities, medical education institutions, and community colleges. Research at facilities within the region also helps to solve some of society's most pressing problems.

## Higher Education in the Dallas-Fort Worth Area

### Summary of Key Statistics

**17** sizable institutions providing higher education, many with multiple campuses, with other smaller colleges filling specific needs

**350,000** students enrolled at sizable institutions, with others attending smaller schools

**36,000+** employees at the largest universities alone, with thousands more at other institutions

**\$4.9 billion** annual direct spending at largest seven institutions alone

**\$ 810 million** annual research spending at universities and medical institutions

Note: The "Dallas-Fort Worth Area" includes the counties within the North Central Texas Council of Governments Region (Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties.)

Sources: Texas Higher Education Coordinating Board, National Science Foundation Higher Education Research & Development (HERD) Survey, and The Perryman Group.

An outgrowth of providing advanced education is generating an economic stimulus with multiple dimensions. Higher education institutions spend extensively for operational needs, employ faculty and staff, and engage in construction projects; all of these activities lead to multiple rounds of activity within the regional economy. Research funding flows into the region and can generate commercialization opportunities and other positive economic effects. In addition, the enhanced productivity of graduates involves large economic benefits.

The Perryman Group (TPG) was recently asked to examine the economic benefits of higher education facilities across the Dallas-Fort Worth area including the multiplier (or ripple) effects through the economy.

The Perryman Group measured several aspects of the ongoing economic benefits of higher education institutions across the Dallas-Fort Worth area including

- Operational spending (jobs and purchases of needed goods and services);
- Student spending (living expenses);
- Visitor spending (visitors to students and the institutions);

- Research spending (research staff and purchases as well as potential commercialization and societal effects);
- Construction projects; and
- Graduates (overall effects of the increase in productivity).

Each of these aspects of higher education generate broader effects through the economy, which The Perryman Group quantified using its proprietary models and systems. A brief overview of the methods used to measure economic impacts and a definition of terms is provided on page 11, with further detail in the Appendices to this report.

## Ongoing Operations Benefits

As noted, Dallas-Fort Worth area higher education institutions employ thousands of persons and spend billions of dollars in the regional economy each year. This operational spending and employment generates additional business activity across a spectrum of industries.

*Higher education operations in the Dallas-Fort Worth area generate a total annual increase in business activity in the region of **\$13.3 billion** in gross product each year and **193,921** jobs when multiplier effects are considered.*

The Perryman Group estimates that when multiplier effects are considered, ongoing operations of Dallas-Fort Worth area higher education institutions generate a total annual increase in business activity in the Dallas-Fort Worth area of approximately **\$13.3 billion** in gross product each year and **193,921** jobs. Student spending leads to an additional **\$1.1 billion** in annual regional gross product and **13,726** jobs<sup>1</sup>. Tourism and visitor spending associated with higher education facilities in the region generate **\$628.0 million** in gross product and **8,439** jobs in the area for a total ongoing benefit of an estimated **\$15.0 billion** in gross product each year and **216,086** jobs (including multiplier effects). See the following table for further detail and the Appendices to this report for results by major industry group.

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<sup>1</sup> The Perryman Group estimated direct student spending on a “net” basis, adjusting for individuals who would likely be in the area even if they were not attending an institution of higher education. Direct spending estimates were further adjusted to reflect spending by out-of-area students as well as an estimate of those who would leave the area if not for the presence of the area’s higher education facilities.



## Operational Benefits of Dallas-Fort Worth Area Higher Education Institutions: Universities, Medical Education Institutions, and Community Colleges\*

	<b>Total Expenditures</b> (Billions of 2018 Dollars)	<b>Gross Product</b> (Billions of 2018 Dollars)	<b>Personal Income</b> (Billions of 2018 Dollars)	<b>Employment</b> (Permanent Jobs)
<b>DALLAS-FORT WORTH AREA</b>				
Operations	\$24.9	\$13.3	\$9.3	193,921
Student Spending*	\$2.2	\$1.1	\$0.7	13,726
Visitor Spending and Tourism*	\$1.1	\$0.6	\$0.4	8,439
<b>TOTAL ONGOING BENEFITS</b>	<b>\$28.2</b>	<b>\$15.0</b>	<b>\$10.3</b>	<b>216,086</b>
<b>TEXAS</b>				
Operations	\$27.3	\$14.2	\$9.8	203,449
Student Spending*	\$2.4	\$1.1	\$0.7	14,443
Visitor Spending and Tourism*	\$1.2	\$0.7	\$0.4	8,841
<b>TOTAL ONGOING BENEFITS</b>	<b>\$30.9</b>	<b>\$15.9</b>	<b>\$10.9</b>	<b>226,733</b>
<p>* Note: The Dallas-Fort Worth area (North Central Texas Region) includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties. Results for Texas include those within the Dallas-Fort Worth area. Student Spending is net incremental spending and includes spending by out-of-area students as well as an estimate of those who would leave the area for education in the absence of higher education facilities. Visitor Spending and Tourism includes estimated spending by visits to students and personnel and attendance at various events. Components may not sum to totals due to rounding.</p> <p>Source: US Multi-Regional Impact Assessment System, The Perryman Group</p>				

## Universities

Of these overall total amounts, The Perryman Group estimates that universities lead to an increase in business activity of an estimated **\$8.5 billion** in gross product and **122,619** jobs in the Dallas-Fort Worth area when multiplier effects are considered. For the state, benefits are estimated to include **\$9.1 billion** in gross product and **128,650** jobs (including multiplier effects and benefits within the region).

### The Economic Benefits of Dallas-Fort Worth Area Universities\*

	<b>Total Expenditures</b> (Billions of 2018 Dollars)	<b>Gross Product</b> (Billions of 2018 Dollars)	<b>Personal Income</b> (Billions of 2018 Dollars)	<b>Employment</b> (Permanent Jobs)
<b>DALLAS-FORT WORTH AREA</b>				
<b>Operations</b>	\$13.8	\$7.4	\$5.2	107,432
<b>Student Spending*</b>	\$1.2	\$0.6	\$0.4	7,596
<b>Visitor Spending and Tourism*</b>	\$1.0	\$0.6	\$0.3	7,591
<b>TOTAL ONGOING BENEFITS</b>	<b>\$16.0</b>	<b>\$8.5</b>	<b>\$5.9</b>	<b>122,619</b>
<b>TEXAS</b>				
<b>Operations</b>	\$15.2	\$7.8	\$5.4	112,711
<b>Student Spending*</b>	\$1.3	\$0.6	\$0.4	7,987
<b>Visitor Spending and Tourism*</b>	\$1.1	\$0.6	\$0.4	7,952
<b>TOTAL ONGOING BENEFITS</b>	<b>\$17.6</b>	<b>\$9.1</b>	<b>\$6.2</b>	<b>128,650</b>

\* Note: The Dallas-Fort Worth area (North Central Texas Region) includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties. Results for Texas include those within the Dallas-Fort Worth area. Student Spending is net incremental spending and includes spending by out-of-area students as well as an estimate of those who would leave the area for education in the absence of higher education facilities. Visitor Spending and Tourism includes estimated spending by visits to students and personnel and attendance at various events. Components may not sum to totals due to rounding. These benefits are a subset of the overall totals described elsewhere in this report.

Source: US Multi-Regional Impact Assessment System, The Perryman Group

## *Medical Education Institutions*

Some of the higher education institutions in the region provide education for doctors, nurses, and other medical professionals. The Perryman Group estimates that the economic benefits of Dallas-Fort Worth area medical education institutions total **\$4.1 billion** in gross product and **60,081** jobs across the Dallas-Fort Worth area when multiplier effects are considered. For the state, benefits are estimated to include **\$4.4 billion** in gross product and **63,040** jobs (including multiplier effects and benefits within the Region). Note that these results are a subset of the overall totals previously described.

### The Economic Benefits of Dallas-Fort Worth Area Medical Education Institutions\*

	<b>Total Expenditures</b> (Billions of 2018 Dollars)	<b>Gross Product</b> (Billions of 2018 Dollars)	<b>Personal Income</b> (Billions of 2018 Dollars)	<b>Employment</b> (Permanent Jobs)
<b>DALLAS-FORT WORTH AREA</b>				
Operations	\$7.4	\$4.0	\$2.8	57,543
Student Spending*	\$0.3	\$0.1	\$0.1	1,847
Visitor Spending and Tourism*	\$0.09	\$0.05	\$0.03	691
<b>TOTAL ONGOING BENEFITS</b>	<b>\$7.8</b>	<b>\$4.1</b>	<b>\$2.9</b>	<b>60,081</b>
<b>TEXAS</b>				
Operations	\$8.1	\$4.2	\$2.9	60,370
Student Spending*	\$0.3	\$0.2	\$0.09	1,945
Visitor Spending and Tourism*	\$0.1	\$0.05	\$0.03	724
<b>TOTAL ONGOING BENEFITS</b>	<b>\$8.5</b>	<b>\$4.4</b>	<b>\$3.0</b>	<b>63,040</b>

\* Note: The Dallas-Fort Worth area (North Central Texas Region) includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties. Results for Texas include those within the Dallas-Fort Worth area. Student Spending is net incremental spending and includes spending by out-of-area students as well as an estimate of those who would leave the area for education in the absence of higher education facilities. Visitor Spending and Tourism includes estimated spending by visits to students and personnel and attendance at various events. Components may not sum to totals due to rounding. These benefits are a subset of the overall totals described elsewhere in this report.

Source: US Multi-Regional Impact Assessment System, The Perryman Group

## Community Colleges

The portion of overall benefits associated with area community colleges includes an estimated \$2.3 billion in regional gross product and 33,385 jobs in the Dallas-Fort Worth area (\$2.5 billion in gross product and 35,043 jobs in the state).

### The Economic Benefits of Dallas-Fort Worth Area Community Colleges\*

	Total Expenditures (Billions of 2018 Dollars)	Gross Product (Billions of 2018 Dollars)	Personal Income (Billions of 2018 Dollars)	Employment (Permanent Jobs)
<b>DALLAS-FORT WORTH AREA</b>				
Operations	\$3.7	\$2.0	\$1.4	28,946
Student Spending*	\$0.7	\$0.3	\$0.2	4,283
Visitor Spending and Tourism*	\$0.02	\$0.01	\$0.007	157
<b>TOTAL ONGOING BENEFITS</b>	<b>\$4.4</b>	<b>\$2.3</b>	<b>\$1.6</b>	<b>33,385</b>
<b>TEXAS</b>				
Operations	\$4.1	\$2.1	\$1.5	30,368
Student Spending*	\$0.7	\$0.4	\$0.2	4,511
Visitor Spending and Tourism*	\$0.02	\$0.01	\$0.007	165
<b>TOTAL ONGOING BENEFITS</b>	<b>\$4.8</b>	<b>\$2.5</b>	<b>\$1.7</b>	<b>35,043</b>

\* Note: The Dallas-Fort Worth area (North Central Texas Region) includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties. Results for Texas include those within the Dallas-Fort Worth area. Student Spending is net incremental spending and includes spending by out-of-area students as well as an estimate of those who would leave the area for education in the absence of higher education facilities. Visitor Spending and Tourism includes estimated spending by visits to students and personnel and attendance at various events. Components may not sum to totals due to rounding. These benefits are a subset of the overall totals described elsewhere in this report.

Source: US Multi-Regional Impact Assessment System, The Perryman Group

## Measuring Economic Impacts

Any economic stimulus, whether positive or negative, generates multiplier effects throughout the economy. In this instance, higher education institutions' ongoing operations, student and visitor spending, research activity, construction projects, graduates, and other initiatives generate multiplier effects and dynamic responses rippling through the economy.

The Perryman Group's input-output assessment system (the US Multi-Regional Impact Assessment System, which is described in further detail in the Appendices to this report) was developed by the firm more than 35 years ago and has been consistently maintained and updated since that time. The model has been used in hundreds of analyses for clients ranging from major corporations to government agencies and has been peer reviewed on multiple occasions. The impact system uses a variety of data (from surveys, industry information, and other sources) to describe the various goods and services (known as resources or inputs) required to produce another good/service. This process allows for estimation of the total economic impact (including multiplier effects) of the Dallas-Fort Worth Area's higher education institutions. The models used in the current analysis reflect the specific industrial composition and characteristics of the Dallas-Fort Worth area (North Central Texas Region: Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties) and Texas economies. Other aspects of the analysis made use of the firm's comprehensive US Multi-Regional Industry-Occupation System and US Multi-Regional Econometric Model.

Total economic effects are quantified for key measures of business activity:

- **Total expenditures** (or total spending) measure the dollars changing hands as a result of the economic stimulus.
- **Gross product** (or output) is production of goods and services that will come about in each area as a result of the activity. This measure is parallel to the gross domestic product numbers commonly reported by various media outlets and is a subset of total expenditures.
- **Personal income** is dollars that end up in the hands of people in the area; the vast majority of this aggregate derives from the earnings of employees, but payments such as interest and rents are also included.
- **Job gains** are expressed as person-years of employment for a temporary stimulus (such as construction) or permanent jobs for effects that would be ongoing.

Monetary values were quantified on a constant (2018) basis to eliminate the effects of inflation. See the Appendices for additional information regarding the methods and assumptions used in this analysis.

## Construction, Research, and Workforce Effects

The Perryman Group also measured other aspects of the economic benefits of higher education institutions including construction, research, and workforce improvement. As noted, growing enrollments and changes over time lead to a consistent need for construction projects at higher education institutions. In addition, research by faculty and staff members generates substantial benefits, and researchers in university and other higher education settings receive external research funding from public and private sources to enable them to work toward enhancing society's knowledge across a spectrum of topics. Another major benefit to the regional economy is the dramatic increase in workforce productivity associated with higher education.

### *Construction Effects*

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Recent and planned improvements of higher education facilities in the Dallas-Fort Worth area include, among others, new residence halls for students, parking garages, athletic and cultural event venues, and additional buildings

*In a typical year, construction projects at Dallas-Fort Worth area higher education facilities lead to gains in business activity in the region of **\$924.5 million** in gross product and **10,541** person-years of employment including multiplier effects.*

with instructional space as well as laboratories and offices. Significant renovation projects lead to additional gains. These initiatives provide a notable (though transitory) stimulus to the regional economy.

The Perryman Group estimates that in a typical year,

construction projects at Dallas-Fort Worth area higher education facilities lead to almost **\$600 million** in direct construction spending, thus resulting in gains in business activity in the region of **\$924.5 million** in gross product and 10,541 person-years of employment including multiplier effects.

## The Economic Benefits of Construction Projects at Dallas-Fort Worth Area Higher Education Institutions: Universities, Medical Education Institutions, and Community Colleges in a Typical Year

	<b>Total Expenditures</b> (Billions of 2018 Dollars)	<b>Gross Product</b> (Billions of 2018 Dollars)	<b>Personal Income</b> (Billions of 2018 Dollars)	<b>Employment</b> (Person-Years)
<b>DALLAS-FORT WORTH AREA</b>				
Universities	\$1.4	\$0.7	\$0.4	7,443
Medical Education Institutions	\$0.2	\$0.1	\$0.07	1,237
Community Colleges	\$0.3	\$0.2	\$0.1	1,861
<b>TOTAL CONSTRUCTION BENEFITS</b>	<b>\$1.9</b>	<b>\$0.9</b>	<b>\$0.6</b>	<b>10,541</b>
<b>TEXAS</b>				
Universities	\$1.5	\$0.7	\$0.5	7,961
Medical Education Institutions	\$0.2	\$0.1	\$0.08	1,323
Community Colleges	\$0.4	\$0.2	\$0.1	1,990
<b>TOTAL CONSTRUCTION BENEFITS</b>	<b>\$2.1</b>	<b>\$1.0</b>	<b>\$0.7</b>	<b>11,274</b>
<small>* Note: The Dallas-Fort Worth area (North Central Texas Region) includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties. Results for Texas include those within the Dallas-Fort Worth area. Assumes a typical year of construction projects based on patterns in the area. Employment measured in person-years (one person working for one year) due to the transitory nature of construction projects. Components may not sum to totals due to rounding. Source: US Multi-Regional Impact Assessment System, The Perryman Group</small>				

### *Research Benefits*

The benefits of research activity are multifaceted. Conducting research involves jobs for researchers and others as well as various operational expenses (which are included as part of the overall operational impacts of the facilities). In addition, research activity results in spinoff benefits such as commercialization of discoveries, royalties, and the general enhancements to productivity and social wellbeing that emanates from new discoveries. The Perryman Group estimated the benefits of research activity at Dallas-Fort Worth area higher institution facilities during the 2018 fiscal year (including the cumulative effects of ongoing value from past research) based on typical

patterns and empirical studies; these methods are described in the Appendices to this report.

*The total spinoff benefits from FY 2018 research (and the residual benefits from recent years) at Dallas-Fort Worth area higher education institutions is estimated to include **\$3.4 billion** in regional gross product per year as well as **25,027 jobs**.*

The total spinoff benefits from FY 2018 research at Dallas-Fort Worth area higher education institutions is estimated to include **\$3.4 billion** in gross product per year in the Dallas-Fort Worth area as well as **25,027** permanent jobs, based on

typical patterns and including multiplier effects. For Texas, spinoff benefits from FY 2018 research leads to potential gains of **\$4.2 billion** in gross product per year and **27,900** permanent jobs (including effects within the Region).

Research Benefits of Dallas-Fort Worth Area Higher Education Institutions*				
	Total Expenditures (Billions of 2018 Dollars)	Gross Product (Billions of 2018 Dollars)	Personal Income (Billions of 2018 Dollars)	Employment (Permanent Jobs)
<b>DALLAS-FORT WORTH AREA</b>				
Universities	\$0.8	\$0.4	\$0.2	4,220
Medical Education Institutions	\$4.2	\$3.0	\$2.5	20,807
<b>TOTAL RESEARCH SPINOFF BENEFITS</b>	<b>\$5.0</b>	<b>\$3.4</b>	<b>\$2.7</b>	<b>25,027</b>
<b>TEXAS</b>				
Universities	\$1.0	\$0.4	\$0.3	4,790
Medical Education Institutions	\$5.3	\$3.8	\$3.1	23,110
<b>TOTAL RESEARCH SPINOFF BENEFITS</b>	<b>\$6.3</b>	<b>\$4.2</b>	<b>\$3.4</b>	<b>27,900</b>
<b>UNITED STATES</b>				
Universities	\$1.3	\$0.6	\$0.4	6,506
Medical Education Institutions	\$7.2	\$4.6	\$3.8	30,699
<b>TOTAL RESEARCH SPINOFF BENEFITS</b>	<b>\$8.5</b>	<b>\$5.1</b>	<b>\$4.2</b>	<b>37,204</b>
* Note: The Dallas-Fort Worth area includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties. Results for Texas include those within the Dallas-Fort Worth area and results for the United States include those within Texas. Based on typical research commercialization patterns as described in the Appendices to this report. Components may not sum to totals due to rounding. Source: US Multi-Regional Impact Assessment System, The Perryman Group				



Even beyond these effects are societal benefits of research which involve economic components. As new discoveries are disseminated, they lead to improvements in health, business operations, technology, quality of life, and virtually every other aspect of the social complex.

The Perryman Group estimates that the overall societal benefits of research at Dallas-Fort Worth area higher education institutions include **\$5.7 billion** in US gross product and **41,531** jobs.

*Societal benefits of research at Dallas-Fort Worth area higher education institutions include an estimated **\$5.7 billion** in US gross product and **41,531** jobs.*

### Societal Benefits of Research at Dallas-Fort Worth Area Higher Education Institutions\*

	Total Expenditures (Billions of 2018 Dollars)	Gross Product (Billions of 2018 Dollars)	Personal Income (Billions of 2018 Dollars)	Employment (Permanent Jobs)
<b>UNITED STATES</b>				
Universities	\$1.5	\$0.6	\$0.4	7,262
Medical Education Institutions	\$8.1	\$5.1	\$4.3	34,269
<b>TOTAL SOCIETAL RESEARCH BENEFITS</b>	<b>\$9.5</b>	<b>\$5.7</b>	<b>\$4.7</b>	<b>41,531</b>
<b>GLOBAL</b>				
Universities	\$1.9	\$0.8	\$0.5	9,586
Medical Education Institutions	\$10.6	\$6.7	\$5.7	45,235
<b>TOTAL SOCIETAL RESEARCH BENEFITS</b>	<b>\$12.6</b>	<b>\$7.5</b>	<b>\$6.2</b>	<b>54,820</b>

\* Note: Global results include those within the United States. Based research during fiscal 2018 and empirical studies of the societal benefits of research as described in the Appendices to this report. Components may not sum to totals due to rounding.

Source: US Multi-Regional Impact Assessment System, The Perryman Group

## *Workforce Effects*

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From the perspective of the competitiveness of a regional economy, higher education institutions provide a steady stream of graduates to fulfill the hiring needs of businesses. Corporations considering locations or expansions include the availability of excellent higher education opportunities as a decision criterion, and the institutions in the region represent an important competitive advantage.

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*Economic benefits of graduates of Dallas-Fort Worth area higher education institutions include **\$67.4 billion** in gross product in the region each year and **654,982** jobs when multiplier effects are considered.*

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The Perryman Group estimates the incremental economic benefits of graduates of the Dallas-Fort Worth area's higher education institutions includes **\$67.4 billion** in gross

product in the region each year and **654,982** jobs when multiplier effects are considered. For Texas, gains were found to be **\$91.9 billion** in annual gross product and **910,387** jobs (including effects within the Dallas-Fort Worth area). These graduates thus support about **15%** of total economic activity in the region.

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*Graduates of Dallas-Fort Worth area higher education institutions support about 15% of total economic activity in the region.*

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## Benefits of Employed Graduates of Dallas-Fort Worth Area Higher Education Institutions\*

	<b>Total Expenditures</b> (Billions of 2018 Dollars)	<b>Gross Product</b> (Billions of 2018 Dollars)	<b>Personal Income</b> (Billions of 2018 Dollars)	<b>Employment</b> (Permanent Jobs)
<b>DALLAS-FORT WORTH AREA</b>				
Universities	\$130.5	\$60.4	\$35.6	567,806
Medical Education Institutions	\$12.9	\$7.0	\$4.9	87,176
<b>TOTAL WORKFORCE BENEFITS</b>	<b>\$143.5</b>	<b>\$67.4</b>	<b>\$40.5</b>	<b>654,982</b>
<b>TEXAS</b>				
Universities	\$171.7	\$77.5	\$45.9	733,834
Medical Education Institutions	\$27.3	\$14.4	\$10.0	176,553
<b>TOTAL WORKFORCE BENEFITS</b>	<b>\$199.0</b>	<b>\$91.9</b>	<b>\$55.8</b>	<b>910,387</b>

\* Note: The Dallas-Fort Worth area includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties. Results for Texas include those within the Dallas-Fort Worth area. Based on the numbers of graduates from Dallas-Fort Worth area higher education institutions adjusted for industrial employment patterns, retirees, unemployment, and labor force participation. Components may not sum to totals due to rounding.  
Source: US Multi-Regional Impact Assessment System, The Perryman Group

A portion of these effects would be realized even without the region's higher education institutions because students could attend programs in other areas and workers move into the area. However, the existence of the region's universities and colleges clearly plays a critical role in this enhancement of the workforce.

## Economic Benefits of the Region's Largest Institutions

The Perryman Group looked more specifically at the economic benefits of the largest higher education institutions in the Dallas-Fort Worth area. Information was collected directly from these institutions and systems to supplement other publicly available sources of data. Results are presented in the following tables, with impacts segmented by operations, student spending, and visitor spending in the Appendices.

## Dallas-Fort Worth Area Impacts by Institution: Operations, Student Spending, and Visitor Spending

	Total Expenditures (Billions of 2018 Dollars)	Gross Product (Billions of 2018 Dollars)	Personal Income (Billions of 2018 Dollars)	Employment (Permanent Jobs)
<b>UNIVERSITIES</b>				
Southern Methodist University	\$2.9	\$1.6	\$1.1	22,637
Texas Christian University	\$2.8	\$1.5	\$1.0	21,263
Texas A&M University-Commerce	\$0.7	\$0.4	\$0.3	5,622
Texas Woman's University	\$1.5	\$0.8	\$0.5	11,175
The University of Texas at Arlington	\$2.6	\$1.4	\$1.0	20,033
The University of Texas at Dallas	\$2.1	\$1.1	\$0.8	15,992
University of North Texas	\$3.0	\$1.6	\$1.1	23,117
All other	\$0.4	\$0.2	\$0.1	2,781
<b>Total</b>	<b>\$16.0</b>	<b>\$8.5</b>	<b>\$5.9</b>	<b>122,619</b>
<b>MEDICAL EDUCATION</b>				
University of Texas Southwestern Medical School	\$6.8	\$3.6	\$2.5	52,560
University of North Texas Health Science Center	\$0.8	\$0.4	\$0.3	6,111
All other	\$0.2	\$0.1	\$0.1	1,410
<b>Total</b>	<b>\$7.8</b>	<b>\$4.1</b>	<b>\$2.9</b>	<b>60,081</b>
<b>COMMUNITY COLLEGES</b>				
Dallas County Community College District	\$1.8	\$0.9	\$0.6	13,323
Collin College	\$0.6	\$0.3	\$0.2	4,547
All other*	\$2.1	\$1.1	\$0.7	15,516
<b>Total</b>	<b>\$4.4</b>	<b>\$2.3</b>	<b>\$1.6</b>	<b>33,386</b>
<b>OVERALL TOTAL</b>	<b>\$28.2</b>	<b>\$15.0</b>	<b>\$10.3</b>	<b>216,086</b>
<p>* Note: The Dallas-Fort Worth area includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties. Medical education includes only the educational component and excludes health care services. Other community colleges include Tarrant County Community College District, Navarro College, North Central Texas College, Trinity Valley Community College, and Weatherford College. Components may not sum to totals due to rounding. These benefits are a subset of the overall totals described elsewhere in this report. Source: US Multi-Regional Impact Assessment System, The Perryman Group</p>				

## Texas Impacts by Institution: Operations, Student Spending, and Visitor Spending

	Total Expenditures (Billions of 2018 Dollars)	Gross Product (Billions of 2018 Dollars)	Personal Income (Billions of 2018 Dollars)	Employment (Permanent Jobs)
<b>UNIVERSITIES</b>				
Southern Methodist University	\$3.2	\$1.7	\$1.1	23,747
Texas Christian University	\$3.0	\$1.6	\$1.1	22,306
Texas A&M University-Commerce	\$0.8	\$0.4	\$0.3	5,898
Texas Woman's University	\$1.6	\$0.8	\$0.6	11,724
The University of Texas at Arlington	\$2.9	\$1.5	\$1.0	21,020
The University of Texas at Dallas	\$2.3	\$1.2	\$0.8	16,781
University of North Texas	\$3.3	\$1.7	\$1.2	24,255
All other	\$0.4	\$0.2	\$0.1	2,918
<b>Total</b>	<b>\$17.6</b>	<b>\$9.1</b>	<b>\$6.2</b>	<b>128,650</b>
<b>MEDICAL EDUCATION</b>				
University of Texas Southwestern Medical School	\$7.5	\$3.9	\$2.7	55,150
University of North Texas Health Science Center	\$0.9	\$0.4	\$0.3	6,411
All other	\$0.2	\$0.1	\$0.1	1,479
<b>Total</b>	<b>\$8.5</b>	<b>\$4.4</b>	<b>\$3.0</b>	<b>63,040</b>
<b>COMMUNITY COLLEGES</b>				
Dallas County Community College District	\$1.9	\$1.0	\$0.7	13,984
Collin College	\$0.7	\$0.3	\$0.2	4,773
All other	\$2.2	\$1.2	\$0.8	16,286
<b>Total</b>	<b>\$4.8</b>	<b>\$2.5</b>	<b>\$1.7</b>	<b>35,043</b>
<b>OVERALL TOTAL</b>	<b>\$30.9</b>	<b>\$16.0</b>	<b>\$10.9</b>	<b>226,733</b>

\* Note: Medical education includes only the educational component and excludes health care services. Other community colleges include Tarrant County Community College District, Navarro College, North Central Texas College, Trinity Valley Community College, and Weatherford College. Components may not sum to totals due to rounding. These benefits are a subset of the overall totals described elsewhere in this report.

Source: US Multi-Regional Impact Assessment System, The Perryman Group

## Conclusion

The benefits of higher education are widely recognized, ranging from a more informed and involved citizenry to a more productive workforce. Dallas-Fort Worth area higher education institutions are providing high-level training to hundreds of thousands of people, dramatically enhancing economic outcomes at personal, economic, and societal levels.

In addition, these institutions are generating about **\$15.0 billion** in gross product and over **216,000** jobs in the Dallas-Fort Worth area through their operations, student spending, and visitor spending (including multiplier effects). This increased economic activity generates tax receipts to the State and local governments through mechanisms such as increased taxable retail sales and enhanced property values and the associated property taxes. The Perryman Group estimates that fiscal benefits of operations, student spending, and visitor spending lead to increased tax receipts of some **\$879.0 million** to the State and **\$701.9 million** to local government entities (such as cities, counties, school districts, and special districts) in the Dallas-Fort Worth area each year.

Research and development at these universities and medical schools are both providing commercialization opportunities and discoveries with enhance human health and wellbeing as well as the economy. Alumni remaining in the region further enhance the economic effects.

The most competitive economies both now and in the future are those with top-quality workforces supported by excellent higher education opportunities. The Dallas-Fort Worth area's higher education complex offers students the opportunity to enhance their skills and prepare for desirable jobs. These institutions are also shaping the regional economy and providing crucial talent development for current and prospective employers. They are truly the origins of ongoing opportunity.

## Appendix A: Methods Used

### *US Multi-Regional Impact Assessment System*

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The basic modeling technique employed in this study is known as dynamic input-output analysis. This input-output segment of the methodology essentially uses extensive survey data, industry information, and a variety of corroborative source materials to create a matrix describing the various goods and services (known as resources or inputs) required to produce one unit (a dollar's worth) of output for a given sector. Once the base information is compiled, it can be mathematically simulated to generate evaluations of the magnitude of successive rounds of activity involved in the overall production process.

There are two essential steps in conducting an input-output analysis once the system is operational. The first major endeavor is to accurately define the levels of direct activity to be evaluated. In this case, public sources of information including the Texas Higher Education Coordinating Board, the US Bureau of the Census, the US Department of Labor, the Bureau of Economic Analysis and the National Science Foundation, with supplementary research by The Perryman Group. In addition, the largest universities/systems provided additional data. Student spending was based on typical patterns for out-of-area students as well as estimates of those who would leave the region in the absence of local opportunities. Visitor spending was based on the number of campus visits, the types of activities, and typical daily spending patterns for the relevant travel categories. The annual direct construction effects were estimated by using the volume and types of construction occurring in recent years in order to define a "typical" year in terms of both magnitude and composition. Commercialization of research estimates were based on typical patterns from funded basic research as provided by the Association of University Technology Managers<sup>2</sup> localized to the relevant geographic area and adjusted for the specifics of research programs in the area. These estimates are fully adjusted for locations outside the area and attrition patterns. Societal and economic benefits were estimated on a global and national scale and were determined based on detailed academic studies related to

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<sup>2</sup> Association of University Technology Managers®, *AUTM U.S. Licensing Activity Survey: FY2016*, editors Shawn Hawkins, Yiorgos Kostoulas, Alice Li, Nichole R. Mercier, Matthew A. Mroz, Olivia Novac, Ragan Robertson, Nate Ruey, Ashley J. Stevens, April Turley and Karen White, with research assistance by Chrys Gwellem.



the relevant returns to investments in basic medical research.<sup>3</sup> The number of graduates was estimated based on independent research by the Perryman Group, with the number living in the Dallas-Fort Worth area and Texas being estimated using limited available data from some institutions, as well as demographic segments of the US Multi-Regional Econometric Model (described below) and integrated gravity models. The number of graduates working in the area was estimated using the workforce participation segments of the econometric system. An occupational assessment of the area and the state was then conducted to determine the pattern of college graduates using the US Multi-Regional Industry-Occupation System (described below). These results were then mapped to the program offerings of local institutions in order to estimate the profile of the workforce component represented by graduates of local institutions. The occupational system was then reverse simulated to determine the approximate industrial patterns across more than 500 sectors of the regional and state economies. With respect to the medical education institutions, this process was further extended to reflect the role that physicians play in supporting the overall health care complex. This process made use of the US Multi-Regional Econometric model.

The second major phase of the analysis is the simulation of the input-output system to measure overall economic effects of the direct excess costs of the current situation. The present study was conducted within the context of the US Multi-Regional Impact Assessment System (USMRIAS) which was developed and is maintained by The Perryman Group. This model has been used in hundreds of diverse applications across the country and has an excellent reputation for accuracy and credibility; it has also been peer reviewed on multiple occasions. The systems used in the current simulations reflect the unique industrial structure of the North Central Texas Region and Texas economies.

The USMRIAS is somewhat similar in format to the Input-Output Model of the United States which is maintained by the US Department of Commerce. The model developed by TPG, however, incorporates several important enhancements and refinements. Specifically, the expanded system includes (1) comprehensive 500-sector coverage for any county, multi-county, or urban region; (2) calculation

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<sup>3</sup> See, in particular, Hall Bronwyn, Jacques Mairesse, and Pierre Mohnen; *Measuring the Returns to R&D*; chapter prepared for the *Handbook of the Economics of Innovation*, editors B.H.Hall and N. Rosenberg. December 2009. Frontier Economics, Rates of return to investment in science and innovation, report prepared for the Department for Business Innovation and Skills, July 2014.

of both total expenditures and value-added by industry and region; (3) direct estimation of expenditures for multiple basic input choices (expenditures, output, income, or employment); (4) extensive parameter localization; (5) price adjustments for real and nominal assessments by sectors and areas; (6) measurement of the induced impacts associated with payrolls and consumer spending; (7) embedded modules to estimate multi-sectoral direct spending effects; (8) estimation of retail spending activity by consumers; and (9) comprehensive linkage and integration capabilities with a wide variety of econometric, real estate, occupational, and fiscal impact models.

The impact assessment (input-output) process essentially estimates the amounts of all types of goods and services required to produce one unit (a dollar's worth) of a specific type of output. For purposes of illustrating the nature of the system, it is useful to think of inputs and outputs in dollar (rather than physical) terms. As an example, the construction of a new building will require specific dollar amounts of lumber, glass, concrete, hand tools, architectural services, interior design services, paint, plumbing, and numerous other elements. Each of these suppliers must, in turn, purchase additional dollar amounts of inputs. This process continues through multiple rounds of production, thus generating subsequent increments to business activity. The initial process of building the facility is known as the *direct effect*. The ensuing transactions in the output chain constitute the *indirect effect*.

Another pattern that arises in response to any direct economic activity comes from the payroll dollars received by employees at each stage of the production cycle. As workers are compensated, they use some of their income for taxes, savings, and purchases from external markets. A substantial portion, however, is spent locally on food, clothing, health care services, utilities, housing, recreation, and other items. Typical purchasing patterns in the relevant areas are obtained from the Center for Community and Economic Research *Cost of Living Index*, a privately compiled inter-regional measure which has been widely used for several decades, and the *Consumer Expenditure Survey* of the US Department of Labor. These initial outlays by area residents generate further secondary activity as local providers acquire inputs to meet this consumer demand. These consumer spending impacts are known as the *induced effect*. The USMRIAS is designed to provide realistic, yet conservative, estimates of these phenomena.

Sources for information used in this process include the Bureau of the Census, the Bureau of Labor Statistics, the Regional Economic Information System of the US Department of Commerce, and other public and private sources. The pricing data are compiled from the US Department of Labor and the US Department of

Commerce. The verification and testing procedures make use of extensive public and private sources.

Impacts were measured in constant 2018 dollars to eliminate the effects of inflation.

The USMRIAS generates estimates of the effect on several measures of business activity. The most comprehensive measure of economic activity used in this study is **Total Expenditures**. This measure incorporates every dollar that changes hands in any transaction. For example, suppose a farmer sells wheat to a miller for \$0.50; the miller then sells flour to a baker for \$0.75; the baker, in turn, sells bread to a customer for \$1.25. The Total Expenditures recorded in this instance would be \$2.50, that is,  $\$0.50 + \$0.75 + \$1.25$ . This measure is quite broad but is useful in that (1) it reflects the overall interplay of all industries in the economy, and (2) some key fiscal variables such as sales taxes are linked to aggregate spending.

A second measure of business activity frequently employed in this analysis is that of **Gross Product**. This indicator represents the regional equivalent of Gross Domestic Product, the most commonly reported statistic regarding national economic performance. In other words, the Gross Product of Texas is the amount of US output that is produced in that state; it is defined as the value of all final goods produced in a given region for a specific period of time. Stated differently, it captures the amount of value-added (gross area product) over intermediate goods and services at each stage of the production process, that is, it eliminates the double counting in the Total Expenditures concept. Using the example above, the Gross Product is \$1.25 (the value of the bread) rather than \$2.50.

Alternatively, it may be viewed as the sum of the value-added by the farmer, \$0.50; the miller, \$0.25 ( $\$0.75 - \$0.50$ ); and the baker, \$0.50 ( $\$1.25 - \$0.75$ ). The total value-added is, therefore, \$1.25, which is equivalent to the final value of the bread. In many industries, the primary component of value-added is the wage and salary payments to employees.

The third gauge of economic activity used in this evaluation is **Personal Income**. As the name implies, Personal Income is simply the income received by individuals, whether in the form of wages, salaries, interest, dividends, proprietors' profits, or other sources. It may thus be viewed as the segment of overall impacts which flows directly to the citizenry.

The fourth measure, **Retail Sales**, represents the component of Total Expenditures which occurs in retail outlets (general merchandise stores, automobile dealers and service stations, building materials stores, food stores,

drugstores, restaurants, and so forth). Retail Sales is a commonly used measure of consumer activity.

The final aggregates used are **Permanent Jobs and Person-Years of Employment**, reflect the full-time equivalent jobs generated by an activity. For an economic stimulus expected to endure (such as the ongoing operations of a facility), the Permanent Jobs Measure is used. It should be noted that, unlike the dollar values described above, Permanent Jobs is a “stock” rather than a “flow.” In other words, if an area produces \$1 million in output in 2016 and \$1 million in 2017, it is appropriate to say that \$2 million was achieved in the 2016-17 period. If the same area has 100 people working in 2016 and 100 in 2017, it only has 100 Permanent Jobs. When a flow of jobs is measured, such as in a construction project or a cumulative assessment over multiple years, it is appropriate to measure employment in Person-Years (a person working for a year). This concept is distinct from Permanent Jobs, which anticipates that the relevant positions will be maintained on a continuing basis.

In addition to the economic aggregates, the model fully integrates the specific provisions and rate structures associated with major sources of State and local revenues on a detailed industrial basis, allowing for the estimation of the fiscal benefits associated with the economic stimulus.

## *US Multi-Regional Econometric Model*

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### **Overview**

The US Multi-Regional Econometric Model (also known as the Texas Econometric Model) was developed by Dr. M. Ray Perryman, President and CEO of The Perryman Group (TPG), beginning 40 years ago as a Texas model and has been consistently maintained, expanded, and updated to a national level since that time. It is formulated in an internally consistent manner and is designed to permit the integration of relevant global, national, state, and local factors into the projection process. It is the result of more than three decades of continuing research in econometrics, economic theory, statistical methods, and key policy issues and behavioral patterns, as well as intensive, ongoing study of all aspects of the global, US, state, and metropolitan area economies. It is extensively used by scores of federal and State governmental entities on an ongoing basis, as well as hundreds of major corporations. It is employed in the current analysis to generate estimates of various inputs for which complete information is not available and in defining demographic and employment profiles of graduates of local institutions at both the state and regional levels.

This section describes the forecasting process in a comprehensive manner, focusing on both the modeling and the supplemental analysis. The overall methodology, while certainly not ensuring perfect foresight, permits an enormous body of relevant information to impact the economic outlook in a systematic manner.

### **Model Logic and Structure**

The US Multi-Regional Econometric Model revolves around a core system which projects output (real and nominal), income (real and nominal), and employment by industry in a simultaneous manner. For purposes of illustration, it is useful to initially consider the employment functions. Essentially, employment within the system is a derived demand relationship obtained from a neo-Classical production function. The expressions are augmented to include dynamic temporal adjustments to changes in relative factor input costs, output and (implicitly) productivity, and technological progress over time. Thus, the typical equation includes output, the relative real cost of labor and capital, dynamic lag structures, and a technological adjustment parameter. The functional form is logarithmic, thus preserving the theoretical consistency with the neo-Classical formulation.

The income segment of the model is divided into wage and non-wage components. The wage equations, like their employment counterparts, are

individually estimated at the 3-digit North American Industry Classification System (NAICS) level of aggregation. Hence, income by place of work is measured for approximately 90 production categories. The wage equations measure real compensation, with the form of the variable structure differing between “basic” and “non-basic.”

The basic industries, comprised primarily of the various components of Mining, Agriculture, and Manufacturing, are export-oriented, i.e., they bring external dollars into the area and form the core of the economy. The production of these sectors typically flows into national and international markets; hence, the labor markets are influenced by conditions in areas beyond the borders of the particular region. Thus, real (inflation-adjusted) wages in the basic industry are expressed as a function of the corresponding national rates, as well as measures of local labor market conditions (the reciprocal of the unemployment rate), dynamic adjustment parameters, and ongoing trends.

The “non-basic” sectors are somewhat different in nature, as the strength of their labor markets is linked to the health of the local export sectors. Consequently, wages in these industries are related to those in the basic segment of the economy. The relationship also includes the local labor market measures contained in the basic wage equations.

Note that compensation rates in the export or “basic” sectors provide a key element of the interaction of the regional economies with national and international market phenomena, while the “non-basic” or local industries are strongly impacted by area production levels. Given the wage and employment equations, multiplicative identities in each industry provide expressions for total compensation; these totals may then be aggregated to determine aggregate wage and salary income. Simple linkage equations are then estimated for the calculation of personal income by place of work.

The non-labor aspects of personal income are modeled at the regional level using straightforward empirical expressions relating to national performance, dynamic responses, and evolving temporal patterns. In some instances (such as dividends, rents, and others) national variables (for example, interest rates) directly enter the forecasting system. These factors have numerous other implicit linkages into the system resulting from their simultaneous interaction with other phenomena in national and international markets which are explicitly included in various expressions.

The output or gross area product expressions are also developed at the 3-digit NAICS level. Regional output for basic industries is linked to national performance

in the relevant industries, local and national production in key related sectors, relative area and national labor costs in the industry, dynamic adjustment parameters, and ongoing changes in industrial interrelationships (driven by technological changes in production processes).

Output in the non-basic sectors is modeled as a function of basic production levels, output in related local support industries (if applicable), dynamic temporal adjustments, and ongoing patterns. The inter-industry linkages are obtained from the input-output (impact assessment) system which is part of the overall integrated modeling structure maintained by The Perryman Group. Note that the dominant component of the econometric system involves the simultaneous estimation and projection of output (real and nominal), income (real and nominal), and employment at a disaggregated industrial level. This process, of necessity, also produces projections of regional price deflators by industry. These values are affected by both national pricing patterns and local cost variations and permit changes in prices to impact other aspects of economic behavior. Income is converted from real to nominal terms using the appropriate Consumer Price Index.

Several other components of the model are critical to the forecasting process. The demographic module includes (1) a linkage equation between wage and salary (establishment) employment and household employment, (2) a labor force participation rate function, and (3) a complete population system with endogenous migration. Given household employment, labor force participation (which is a function of economic conditions and evolving patterns of worker preferences), and the working age population, the unemployment rate and level become identities.

The population system uses Census information, fertility rates, and life tables to determine the “natural” changes in population by age group. Migration, the most difficult segment of population dynamics to track, is estimated in relation to relative regional and extra-regional economic conditions over time. Because evolving economic conditions determine migration in the system, population changes are allowed to interact simultaneously with overall economic conditions. Through this process, migration is treated as endogenous to the system, thus allowing population to vary in accordance with relative business performance (particularly employment).

Real retail sales is related to income, interest rates, dynamic adjustments, and patterns in consumer behavior on a store group basis. It is expressed on an inflation-adjusted basis. Inflation at the state level relates to national patterns,

indicators of relative economic conditions, and ongoing trends. As noted earlier, prices are endogenous to the system.

A final significant segment of the forecasting system relates to real estate absorption and activity. The short-term demand for various types of property is determined by underlying economic and demographic factors, with short-term adjustments to reflect the current status of the pertinent building cycle. In some instances, this portion of the forecast requires integration with the Multi-Regional Industry-Occupation System which is maintained by The Perryman Group. This system also allows any employment simulation or forecast from the econometric model to be translated into a highly detailed occupational profile.

The overall US Multi-Regional Econometric Model contains numerous additional specifications, and individual expressions are modified to reflect alternative lag structures, empirical properties of the estimates, simulation requirements, and similar phenomena. Moreover, it is updated on an ongoing basis as new data releases become available. Nonetheless, the above synopsis offers a basic understanding of the overall structure and underlying logic of the system.

### **Model Simulation and Multi-Regional Structure**

The initial phase of the simulation process is the execution of a standard non-linear algorithm for the state-level system and that of each of the individual sub-areas, if any, being examined. The external assumptions are derived from scenarios developed through national and international models and extensive analysis by The Perryman Group.

Once the initial simulations are completed, they are merged into a single system with additive constraints and interregional flows. Using information on minimum regional requirements, import needs, export potential, and locations, it becomes possible to balance the various forecasts into a mathematically consistent set of results.

The iterative simulation process has the additional property of imposing a global convergence criterion across the entire multi-regional system, with balance being achieved simultaneously on both a sectoral and a geographic basis. This approach is particularly critical on non-linear dynamic systems, as independent simulations of individual systems often yield unstable, non-convergent outcomes.

It should be noted that the underlying data for the modeling and simulation process are frequently updated and revised by the various public and private entities compiling them. Whenever those modifications to the database occur, they bring corresponding changes to the structural parameter estimates of the



various systems and the solutions to the simulation and forecasting system. The multi-regional version of the US Multi-Regional Econometric Model is re-estimated and simulated with each such data release, thus providing a constantly evolving and current assessment of state and local business activity.

### **The Final Forecast**

The process described above is followed to produce an initial set of projections. Through the comprehensive multi-regional modeling and simulation process, a systematic analysis is generated which accounts for both historical patterns in economic performance and inter-relationships and best available information on the future course of pertinent external factors. While the best available techniques and data are employed in this effort, they are not capable of directly capturing “street sense,” i.e., the contemporaneous and often non-quantifiable information that can materially affect economic outcomes. In order to provide a comprehensive approach to the prediction of business conditions and to achieve the property of statistical consistence, it is necessary to compile and assimilate extensive material regarding current events and factors affecting the forecast.

This critical aspect of the forecasting methodology includes activities such as (1) daily review of hundreds of financial and business publications and electronic information sites; (2) review of major newspapers and online news sources on a daily basis; (3) direct discussions with key business and political leaders; (4) face-to-face discussions with representatives of major industry groups; and (5) frequent site visits to various regions. The insights arising from this “fact finding” are analyzed and evaluated for their effects on the likely course of the future activity.

Another vital information resource stems from the firm’s ongoing interaction with key players in the international, domestic, and state economic scenes. Such activities include visiting with corporate groups on a regular basis and being regularly involved in the policy process at all levels. The firm is also an active participant in many major corporate relocations, economic development initiatives, and regulatory proceedings.

Once organized, this information is carefully assessed and, when appropriate, independently verified. The impact on specific communities and sectors that is distinct from what is captured by the econometric system is then factored into the forecast analysis. For example, the opening or closing of a major facility, particularly in a relatively small area, can cause a sudden change in business performance that will not be accounted for by either a modeling system based on historical relationships or expected (primarily national and international) factors.

The final step in the forecasting process is the integration of this material into the results in a logical and mathematically consistent manner. In some instances, this task is accomplished through “constant adjustment factors” which augment relevant equations. In other cases, anticipated changes in industrial structure or regulatory parameters are initially simulated within the context of the Multi-Regional Impact Assessment System to estimate their ultimate effects by sector. Those findings are then factored into the simulation as constant adjustments on a distributed temporal basis. Once this scenario is formulated, the extended system is again balanced across regions and sectors through an iterative simulation algorithm analogous to that described in the preceding section.

### *US Multi-Regional Industry-Occupation System*

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The US Multi-Regional Industry-Occupation System translates standard data on employment by industry into estimates of occupational categories at a highly detailed level. The system was used extensively in the present analysis to define the occupational and industrial patterns of the graduates of local institutions in the Dallas-Fort Worth area and Texas.

The modeling process begins with the industry-occupation coefficients compiled by the US Department of Labor based on extensive surveys of operating patterns in thousands of firms and other secondary sources. As an example, a typical tire plant of a given size requires machinists, mechanics, plant managers, administrative staff, custodial staff, shipping personnel, and numerous other types of workers. By compiling this information across the entire economy, a matrix is created which allows the data on employment by industry (which is regularly compiled) to be translated into employment by occupation. The Perryman Group takes this basic structure and links it specifically to the economy of Texas and its various metropolitan areas, regions, and counties, accounting for productivity and production patterns in each area. It is also regularly updated to reflect evolving patterns. The system can be fully integrated with historical employment data and the projections obtained from the Texas Econometric Model. It can also be linked to results from the US Multi-Regional Impact Assessment System. Thus, the industry-occupation system is a flexible mechanism to allow extensive evaluations of workforce characteristics and patterns. It is highly detailed, providing results for approximately 700 occupational categories.

## Appendix B: Additional Results

### *Results by Institution*

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**Operations Impacts by Institution: Dallas-Fort Worth Area**

<b>University</b>	<b>Total Expenditures</b>	<b>Gross Product</b>	<b>Personal Income</b>	<b>Permanent Jobs</b>
Southern Methodist University	\$2,522.8 m	\$1,347.8 m	\$940.4 m	19,615
Texas Christian University	\$2,401.7 m	\$1,283.1 m	\$895.3 m	18,673
Texas A&M University-Commerce	\$636.0 m	\$339.8 m	\$237.1 m	4,945
Texas Woman's University	\$1,305.7 m	\$697.5 m	\$486.7 m	10,151
The University of Texas at Arlington	\$2,195.1 m	\$1,172.7 m	\$818.3 m	17,067
The University of Texas at Dallas	\$1,856.0 m	\$991.5 m	\$691.8 m	14,430
University of North Texas	\$2,580.0 m	\$1,378.3 m	\$961.7 m	20,059
All other	\$320.6 m	\$171.2 m	\$119.5 m	2,492
<b>Total, All Universities</b>	<b>\$13,817.9 m</b>	<b>\$7,381.9 m</b>	<b>\$5,150.8 m</b>	<b>107,432</b>

<b>Medical Education*</b>	<b>Total Expenditures</b>	<b>Gross Product</b>	<b>Personal Income</b>	<b>Permanent Jobs</b>
University of Texas Southwestern Medical Center	\$6,461.5 m	\$3,451.9 m	\$2,408.6 m	50,237
University of North Texas Health Science Center	\$767.9 m	\$410.2 m	\$286.3 m	5,971
All other	\$171.7 m	\$91.7 m	\$64.0 m	1,335
<b>Total, All Medical Education Institutions</b>	<b>\$7,401.1 m</b>	<b>\$3,953.9 m</b>	<b>\$2,758.9 m</b>	<b>57,543</b>

<b>Community College</b>	<b>Total Expenditures</b>	<b>Gross Product</b>	<b>Personal Income</b>	<b>Permanent Jobs</b>
Dallas County Community College District	\$1,495.7 m	\$799.0 m	\$557.5 m	11,629
Collin College	\$495.9 m	\$264.9 m	\$184.8 m	3,855
All Other*	\$1,731.4 m	\$925.0 m	\$645.4 m	13,461
<b>Total, All Community Colleges</b>	<b>\$3,723.0 m</b>	<b>\$1,988.9 m</b>	<b>\$1,387.8 m</b>	<b>28,946</b>

<b>TOTAL, ALL INSTITUTIONS</b>	<b>\$24,941.9 m</b>	<b>\$13,324.7 m</b>	<b>\$9,297.5 m</b>	<b>193,921</b>
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Sources: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in millions of 2018 US dollars. Components may not sum due to rounding. These benefits are a subset of the overall totals described elsewhere in this report. The Dallas-Fort Worth area includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties. Other community colleges include the Tarrant County Community College District, Navarro College, North Central Texas College, Trinity Valley Community College, and Weatherford College.

## Operations Impacts by Institution: Texas

University	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Southern Methodist University	\$2,766.3 m	\$1,432.6 m	\$994.2 m	20,578
Texas Christian University	\$2,633.5 m	\$1,363.8 m	\$946.5 m	19,590
Texas A&M University-Commerce	\$697.4 m	\$361.2 m	\$250.6 m	5,188
Texas Woman's University	\$1,431.7 m	\$741.4 m	\$514.5 m	10,650
The University of Texas at Arlington	\$2,407.0 m	\$1,246.5 m	\$865.1 m	17,905
The University of Texas at Dallas	\$2,035.1 m	\$1,053.9 m	\$731.4 m	15,139
University of North Texas	\$2,829.0 m	\$1,465.0 m	\$1,016.7 m	21,045
All other	\$351.5 m	\$182.0 m	\$126.3 m	2,615
<b>Total, All Universities</b>	<b>\$15,151.4 m</b>	<b>\$7,846.4 m</b>	<b>\$5,445.4 m</b>	<b>112,711</b>

  

Medical Education*	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
University of Texas Southwestern Medical Center	\$7,085.1 m	\$3,669.1 m	\$2,546.4 m	52,706
University of North Texas Health Science Center	\$842.0 m	\$436.1 m	\$302.6 m	6,264
All other	\$188.3 m	\$97.5 m	\$67.7 m	1,400
<b>Total, All Medical Education Institutions</b>	<b>\$8,115.4 m</b>	<b>\$4,202.7 m</b>	<b>\$2,916.7 m</b>	<b>60,370</b>

  

Community College	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Dallas County Community College District	\$1,640.0 m	\$849.3 m	\$589.4 m	12,200
Collin College	\$543.7 m	\$281.6 m	\$195.4 m	4,045
All Other*	\$1,898.5 m	\$983.2 m	\$682.3 m	14,123
<b>Total, All Community Colleges</b>	<b>\$4,082.3 m</b>	<b>\$2,114.1 m</b>	<b>\$1,467.2 m</b>	<b>30,368</b>

  

<b>TOTAL, ALL INSTITUTIONS</b>	<b>\$27,349.0 m</b>	<b>\$14,163.2 m</b>	<b>\$9,829.2 m</b>	<b>203,449</b>
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Sources: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in millions of 2018 US dollars. Components may not sum due to rounding. These benefits are a subset of the overall totals described elsewhere in this report. Medical education includes only the educational component and excludes health care services. Other community colleges include the Tarrant County Community College District, Navarro College, North Central Texas College, Trinity Valley Community College, and Weatherford College.

**Student Spending Impacts by Institution: Dallas-Fort Worth Area**

<b>University</b>	<b>Total Expenditures</b>	<b>Gross Product</b>	<b>Personal Income</b>	<b>Permanent Jobs</b>
Southern Methodist University	\$120.4 m	\$59.5 m	\$36.7 m	767
Texas Christian University	\$111.5 m	\$55.1 m	\$34.0 m	710
Texas A&M University-Commerce	\$44.9 m	\$22.2 m	\$13.7 m	287
Texas Woman's University	\$97.7 m	\$48.3 m	\$29.8 m	623
The University of Texas at Arlington	\$287.0 m	\$141.8 m	\$87.5 m	1,830
The University of Texas at Dallas	\$210.1 m	\$103.8 m	\$64.1 m	1,339
University of North Texas	\$296.3 m	\$146.4 m	\$90.3 m	1,889
All other	\$23.6 m	\$11.7 m	\$7.2 m	151
<b>Total, All Universities</b>	<b>\$1,191.5 m</b>	<b>\$588.7 m</b>	<b>\$363.3 m</b>	<b>7,596</b>

<b>Medical Education</b>	<b>Total Expenditures</b>	<b>Gross Product</b>	<b>Personal Income</b>	<b>Permanent Jobs</b>
University of Texas Southwestern Medical Center	\$265.3 m	\$131.0 m	\$80.8 m	1,690
University of North Texas Health Science Center	\$16.0 m	\$7.9 m	\$4.9 m	102
All other	\$8.6 m	\$4.2 m	\$2.6 m	55
<b>Total, All Medical Education Institutions</b>	<b>\$289.9 m</b>	<b>\$143.1 m</b>	<b>\$88.3 m</b>	<b>1,847</b>

<b>Community College</b>	<b>Total Expenditures</b>	<b>Gross Product</b>	<b>Personal Income</b>	<b>Permanent Jobs</b>
Dallas County Community College District	\$256.5 m	\$126.6 m	\$78.1 m	1,634
Collin College	\$104.7 m	\$51.7 m	\$31.9 m	667
All Other*	\$311.0 m	\$153.6 m	\$94.8 m	1,982
<b>Total, All Community Colleges</b>	<b>\$672.2 m</b>	<b>\$331.9 m</b>	<b>\$204.8 m</b>	<b>4,283</b>

**TOTAL, ALL INSTITUTIONS**      **\$2,153.6 m**      **\$1,063.8 m**      **\$656.5 m**      **13,726**

Sources: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in millions of 2018 US dollars. Components may not sum due to rounding. These benefits are a subset of the overall totals described elsewhere in this report. The Dallas-Fort Worth area includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties. Other community colleges include the Tarrant County Community College District, Navarro College, North Central Texas College, Trinity Valley Community College, and Weatherford College.

### Student Spending Impacts by Institution: Texas

University	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Southern Methodist University	\$131.4 m	\$63.1 m	\$39.0 m	807
Texas Christian University	\$121.7 m	\$58.5 m	\$36.1 m	747
Texas A&M University-Commerce	\$49.0 m	\$23.6 m	\$14.5 m	301
Texas Woman's University	\$106.7 m	\$51.3 m	\$31.7 m	655
The University of Texas at Arlington	\$313.3 m	\$150.5 m	\$93.0 m	1,924
The University of Texas at Dallas	\$229.3 m	\$110.2 m	\$68.1 m	1,408
University of North Texas	\$323.3 m	\$155.4 m	\$96.0 m	1,986
All other	\$25.8 m	\$12.4 m	\$7.7 m	159
<b>Total, All Universities</b>	<b>\$1,300.4 m</b>	<b>\$624.9 m</b>	<b>\$386.0 m</b>	<b>7,987</b>

Medical Education	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
University of Texas Southwestern Medical Center	\$290.1 m	\$139.3 m	\$86.0 m	1,781
University of North Texas Health Science Center	\$17.5 m	\$8.4 m	\$5.2 m	107
All other	\$9.4 m	\$4.5 m	\$2.8 m	57
<b>Total, All Medical Education Institutions</b>	<b>\$317.0 m</b>	<b>\$152.2 m</b>	<b>\$94.0 m</b>	<b>1,945</b>

Community College	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Dallas County Community College District	\$280.4 m	\$134.6 m	\$83.2 m	1,721
Collin College	\$114.5 m	\$55.0 m	\$34.0 m	703
All Other*	\$340.1 m	\$163.3 m	\$100.9 m	2,087
<b>Total, All Community Colleges</b>	<b>\$735.0 m</b>	<b>\$352.9 m</b>	<b>\$218.0 m</b>	<b>4,511</b>

**TOTAL, ALL INSTITUTIONS**      **\$2,352.4 m**      **\$1,130.0 m**      **\$698.0 m**      **14,443**

Sources: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in millions of 2018 US dollars. Components may not sum due to rounding. These benefits are a subset of the overall totals described elsewhere in this report. Other community colleges include the Tarrant County Community College District, Navarro College, North Central Texas College, Trinity Valley Community College, and Weatherford College.



**Visitor Spending Impacts by Institution: Dallas-Fort Worth Area**

<b>University</b>	<b>Total Expenditures</b>	<b>Gross Product</b>	<b>Personal Income</b>	<b>Permanent Jobs</b>
Southern Methodist University	\$301.6 m	\$167.8 m	\$101.4 m	2,255
Texas Christian University	\$251.4 m	\$139.9 m	\$84.5 m	1,880
Texas A&M University-Commerce	\$52.2 m	\$29.1 m	\$17.6 m	391
Texas Woman's University	\$53.5 m	\$29.8 m	\$18.0 m	400
The University of Texas at Arlington	\$151.9 m	\$84.5 m	\$51.1 m	1,136
The University of Texas at Dallas	\$29.8 m	\$16.6 m	\$10.0 m	223
University of North Texas	\$156.3 m	\$87.0 m	\$52.5 m	1,169
All other	\$18.5 m	\$10.3 m	\$6.2 m	138
<b>Total, All Universities</b>	<b>\$1,015.3 m</b>	<b>\$564.9 m</b>	<b>\$341.3 m</b>	<b>7,591</b>

<b>Medical Education</b>	<b>Total Expenditures</b>	<b>Gross Product</b>	<b>Personal Income</b>	<b>Permanent Jobs</b>
University of Texas Southwestern Medical Center	\$84.6 m	\$47.1 m	\$28.5 m	633
University of North Texas Health Science Center	\$5.1 m	\$2.8 m	\$1.7 m	38
All other	\$2.7 m	\$1.5 m	\$0.9 m	20
<b>Total, All Medical Education Institutions</b>	<b>\$92.5 m</b>	<b>\$51.5 m</b>	<b>\$31.1 m</b>	<b>691</b>

<b>Community College</b>	<b>Total Expenditures</b>	<b>Gross Product</b>	<b>Personal Income</b>	<b>Permanent Jobs</b>
Dallas County Community College District	\$8.0 m	\$4.5 m	\$2.7 m	60
Collin College	\$3.3 m	\$1.8 m	\$1.1 m	24
All Other*	\$9.7 m	\$5.4 m	\$3.3 m	73
<b>Total, All Community Colleges</b>	<b>\$21.0 m</b>	<b>\$11.7 m</b>	<b>\$7.1 m</b>	<b>157</b>

<b>TOTAL, ALL INSTITUTIONS</b>	<b>\$1,128.7 m</b>	<b>\$628.0 m</b>	<b>\$379.4 m</b>	<b>8,439</b>
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Sources: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in millions of 2018 US dollars. Components may not sum due to rounding. These benefits are a subset of the overall totals described elsewhere in this report. The Dallas-Fort Worth area includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties. Other community colleges include the Tarrant County Community College District, Navarro College, North Central Texas College, Trinity Valley Community College, and Weatherford College.

### Visitor Spending Impacts by Institution: Texas

University	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Southern Methodist University	\$331.1 m	\$177.6 m	\$107.5 m	2,362
Texas Christian University	\$276.0 m	\$148.0 m	\$89.6 m	1,969
Texas A&M University-Commerce	\$57.3 m	\$30.8 m	\$18.6 m	409
Texas Woman's University	\$58.7 m	\$31.5 m	\$19.1 m	419
The University of Texas at Arlington	\$166.8 m	\$89.4 m	\$54.1 m	1,190
The University of Texas at Dallas	\$32.7 m	\$17.5 m	\$10.6 m	233
University of North Texas	\$171.6 m	\$92.0 m	\$55.7 m	1,224
All other	\$20.3 m	\$10.9 m	\$6.6 m	145
<b>Total, All Universities</b>	<b>\$1,114.5 m</b>	<b>\$597.7 m</b>	<b>\$361.7 m</b>	<b>7,952</b>

Medical Education	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
University of Texas Southwestern Medical Center	\$92.9 m	\$49.8 m	\$30.2 m	663
University of North Texas Health Science Center	\$5.6 m	\$3.0 m	\$1.8 m	40
All other	\$3.0 m	\$1.6 m	\$1.0 m	21
<b>Total, All Medical Education Institutions</b>	<b>\$101.5 m</b>	<b>\$54.4 m</b>	<b>\$32.9 m</b>	<b>724</b>

Community College	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Dallas County Community College District	\$8.8 m	\$4.7 m	\$2.9 m	63
Collin College	\$3.6 m	\$1.9 m	\$1.2 m	26
All Other*	\$10.7 m	\$5.7 m	\$3.5 m	76
<b>Total, All Community Colleges</b>	<b>\$23.1 m</b>	<b>\$12.4 m</b>	<b>\$7.5 m</b>	<b>165</b>

<b>TOTAL, ALL INSTITUTIONS</b>	<b>\$1,239.1 m</b>	<b>\$664.5 m</b>	<b>\$402.2 m</b>	<b>8,841</b>
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Sources: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in millions of 2018 US dollars. Components may not sum due to rounding. These benefits are a subset of the overall totals described elsewhere in this report. Other community colleges include the Tarrant County Community College District, Navarro College, North Central Texas College, Trinity Valley Community College, and Weatherford College.

*Detailed Sectoral Results*

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**Operations**



### The Impact of Current Operations Associated with Universities on Business Activity in the Dallas-Fort Worth Area

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.095 b	\$0.028 b	\$0.019 b	291
Mining	\$0.119 b	\$0.027 b	\$0.015 b	77
Construction	\$0.331 b	\$0.178 b	\$0.147 b	2,012
Manufacturing	\$1.458 b	\$0.491 b	\$0.277 b	4,495
Transportation & Utilities	\$0.932 b	\$0.403 b	\$0.241 b	2,776
Information	\$0.312 b	\$0.192 b	\$0.082 b	720
Wholesale Trade	\$0.455 b	\$0.308 b	\$0.177 b	1,970
Retail Trade*	\$1.893 b	\$1.414 b	\$0.821 b	24,769
Financial Activities*	\$2.332 b	\$0.645 b	\$0.219 b	2,202
Business Services	\$0.547 b	\$0.337 b	\$0.275 b	3,265
Health Services	\$0.404 b	\$0.283 b	\$0.239 b	3,864
Other Services	\$4.937 b	\$3.077 b	\$2.639 b	60,992
<b>Total, All Industries</b>	<b>\$13.815 b</b>	<b>\$7.382 b</b>	<b>\$5.151 b</b>	<b>107,432</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding. The Dallas-Fort Worth area includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties.

### The Impact of Current Operations Associated with Medical Education Institutions on Business Activity in the Dallas-Fort Worth Area

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.051 b	\$0.015 b	\$0.010 b	156
Mining	\$0.064 b	\$0.015 b	\$0.008 b	41
Construction	\$0.177 b	\$0.095 b	\$0.079 b	1,078
Manufacturing	\$0.781 b	\$0.263 b	\$0.148 b	2,408
Transportation & Utilities	\$0.499 b	\$0.216 b	\$0.129 b	1,487
Information	\$0.167 b	\$0.103 b	\$0.044 b	385
Wholesale Trade	\$0.243 b	\$0.165 b	\$0.095 b	1,055
Retail Trade*	\$1.014 b	\$0.757 b	\$0.440 b	13,267
Financial Activities*	\$1.249 b	\$0.345 b	\$0.117 b	1,179
Business Services	\$0.293 b	\$0.180 b	\$0.147 b	1,749
Health Services	\$0.216 b	\$0.152 b	\$0.128 b	2,070
Other Services	\$2.648 b	\$1.648 b	\$1.414 b	32,668
<b>Total, All Industries</b>	<b>\$7.403 b</b>	<b>\$3.954 b</b>	<b>\$2.759 b</b>	<b>57,543</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding. The Dallas-Fort Worth area includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties.

### The Impact of Current Operations Associated with Community Colleges on Business Activity in the Dallas-Fort Worth Area

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.026 b	\$0.007 b	\$0.005 b	78
Mining	\$0.032 b	\$0.007 b	\$0.004 b	21
Construction	\$0.089 b	\$0.048 b	\$0.039 b	542
Manufacturing	\$0.393 b	\$0.132 b	\$0.075 b	1,211
Transportation & Utilities	\$0.251 b	\$0.108 b	\$0.065 b	748
Information	\$0.084 b	\$0.052 b	\$0.022 b	194
Wholesale Trade	\$0.122 b	\$0.083 b	\$0.048 b	531
Retail Trade*	\$0.510 b	\$0.381 b	\$0.221 b	6,674
Financial Activities*	\$0.628 b	\$0.174 b	\$0.059 b	593
Business Services	\$0.147 b	\$0.091 b	\$0.074 b	880
Health Services	\$0.109 b	\$0.076 b	\$0.064 b	1,041
Other Services	\$1.332 b	\$0.829 b	\$0.711 b	16,433
<b>Total, All Industries</b>	<b>\$3.724 b</b>	<b>\$1.989 b</b>	<b>\$1.388 b</b>	<b>28,946</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding. The Dallas-Fort Worth area includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties.

### The Impact of Current Operations Associated with Higher Education Institutions on Business Activity in the Dallas-Fort Worth Area

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.172 b	\$0.050 b	\$0.034 b	525
Mining	\$0.214 b	\$0.049 b	\$0.027 b	138
Construction	\$0.598 b	\$0.321 b	\$0.265 b	3,632
Manufacturing	\$2.632 b	\$0.886 b	\$0.499 b	8,114
Transportation & Utilities	\$1.682 b	\$0.727 b	\$0.436 b	5,011
Information	\$0.562 b	\$0.347 b	\$0.148 b	1,299
Wholesale Trade	\$0.821 b	\$0.555 b	\$0.320 b	3,557
Retail Trade*	\$3.417 b	\$2.552 b	\$1.482 b	44,710
Financial Activities*	\$4.209 b	\$1.164 b	\$0.396 b	3,974
Business Services	\$0.987 b	\$0.608 b	\$0.496 b	5,894
Health Services	\$0.729 b	\$0.511 b	\$0.432 b	6,975
Other Services	\$8.918 b	\$5.554 b	\$4.764 b	110,093
<b>Total, All Industries</b>	<b>\$24.942 b</b>	<b>\$13.325 b</b>	<b>\$9.298 b</b>	<b>193,921</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding. The Dallas-Fort Worth area includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties.

### The Impact of Current Operations Associated with Universities on Business Activity in Texas

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.248 b	\$0.074 b	\$0.049 b	754
Mining	\$0.202 b	\$0.047 b	\$0.026 b	146
Construction	\$0.385 b	\$0.207 b	\$0.170 b	2,335
Manufacturing	\$1.861 b	\$0.576 b	\$0.322 b	5,064
Transportation & Utilities	\$1.229 b	\$0.472 b	\$0.273 b	2,935
Information	\$0.318 b	\$0.196 b	\$0.084 b	733
Wholesale Trade	\$0.461 b	\$0.312 b	\$0.180 b	1,997
Retail Trade*	\$2.011 b	\$1.504 b	\$0.873 b	26,306
Financial Activities*	\$2.373 b	\$0.652 b	\$0.222 b	2,235
Business Services	\$0.555 b	\$0.342 b	\$0.279 b	3,313
Health Services	\$0.472 b	\$0.330 b	\$0.279 b	4,506
Other Services	\$5.032 b	\$3.135 b	\$2.689 b	62,386
<b>Total, All Industries</b>	<b>\$15.147 b</b>	<b>\$7.846 b</b>	<b>\$5.445 b</b>	<b>112,711</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding.

### The Impact of Current Operations Associated with Medical Education Institutions on Business Activity in Texas

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.133 b	\$0.040 b	\$0.026 b	404
Mining	\$0.108 b	\$0.025 b	\$0.014 b	78
Construction	\$0.206 b	\$0.111 b	\$0.091 b	1,251
Manufacturing	\$0.997 b	\$0.308 b	\$0.172 b	2,712
Transportation & Utilities	\$0.658 b	\$0.253 b	\$0.146 b	1,572
Information	\$0.170 b	\$0.105 b	\$0.045 b	393
Wholesale Trade	\$0.247 b	\$0.167 b	\$0.096 b	1,070
Retail Trade*	\$1.077 b	\$0.805 b	\$0.468 b	14,090
Financial Activities*	\$1.271 b	\$0.349 b	\$0.119 b	1,197
Business Services	\$0.297 b	\$0.183 b	\$0.149 b	1,774
Health Services	\$0.253 b	\$0.177 b	\$0.149 b	2,413
Other Services	\$2.700 b	\$1.679 b	\$1.440 b	33,415
<b>Total, All Industries</b>	<b>\$8.118 b</b>	<b>\$4.203 b</b>	<b>\$2.917 b</b>	<b>60,370</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding.

### The Impact of Current Operations Associated with Community Colleges on Business Activity in Texas

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.067 b	\$0.020 b	\$0.013 b	203
Mining	\$0.054 b	\$0.013 b	\$0.007 b	39
Construction	\$0.104 b	\$0.056 b	\$0.046 b	629
Manufacturing	\$0.502 b	\$0.155 b	\$0.087 b	1,364
Transportation & Utilities	\$0.331 b	\$0.127 b	\$0.073 b	791
Information	\$0.086 b	\$0.053 b	\$0.023 b	198
Wholesale Trade	\$0.124 b	\$0.084 b	\$0.048 b	538
Retail Trade*	\$0.542 b	\$0.405 b	\$0.235 b	7,088
Financial Activities*	\$0.639 b	\$0.176 b	\$0.060 b	602
Business Services	\$0.150 b	\$0.092 b	\$0.075 b	893
Health Services	\$0.127 b	\$0.089 b	\$0.075 b	1,214
Other Services	\$1.358 b	\$0.845 b	\$0.725 b	16,809
<b>Total, All Industries</b>	<b>\$4.084 b</b>	<b>\$2.114 b</b>	<b>\$1.467 b</b>	<b>30,368</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding.

### The Impact of Current Operations Associated with Higher Education Institutions on Business Activity in Texas

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.448 b	\$0.134 b	\$0.089 b	1,362
Mining	\$0.364 b	\$0.085 b	\$0.047 b	264
Construction	\$0.695 b	\$0.373 b	\$0.307 b	4,215
Manufacturing	\$3.360 b	\$1.039 b	\$0.581 b	9,140
Transportation & Utilities	\$2.219 b	\$0.853 b	\$0.492 b	5,298
Information	\$0.573 b	\$0.353 b	\$0.151 b	1,324
Wholesale Trade	\$0.832 b	\$0.563 b	\$0.325 b	3,605
Retail Trade*	\$3.630 b	\$2.714 b	\$1.576 b	47,484
Financial Activities*	\$4.283 b	\$1.176 b	\$0.401 b	4,035
Business Services	\$1.002 b	\$0.617 b	\$0.503 b	5,980
Health Services	\$0.851 b	\$0.596 b	\$0.504 b	8,133
Other Services	\$9.091 b	\$5.660 b	\$4.854 b	112,609
<b>Total, All Industries</b>	<b>\$27.349 b</b>	<b>\$14.163 b</b>	<b>\$9.829 b</b>	<b>203,449</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding.



**Student Spending**



### The Annual Impact of Net Incremental Student Spending Associated with Universities on Business Activity in the Dallas-Fort Worth Area

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.009 b	\$0.003 b	\$0.002 b	27
Mining	\$0.012 b	\$0.003 b	\$0.002 b	9
Construction	\$0.027 b	\$0.014 b	\$0.011 b	157
Manufacturing	\$0.121 b	\$0.040 b	\$0.023 b	367
Transportation & Utilities	\$0.108 b	\$0.041 b	\$0.024 b	250
Information	\$0.038 b	\$0.023 b	\$0.010 b	88
Wholesale Trade	\$0.039 b	\$0.026 b	\$0.015 b	169
Retail Trade*	\$0.342 b	\$0.258 b	\$0.150 b	4,466
Financial Activities*	\$0.265 b	\$0.044 b	\$0.017 b	172
Business Services	\$0.050 b	\$0.030 b	\$0.024 b	288
Health Services	\$0.063 b	\$0.044 b	\$0.038 b	607
Other Services	\$0.116 b	\$0.061 b	\$0.048 b	996
<b>Total, All Industries</b>	<b>\$1.192 b</b>	<b>\$0.589 b</b>	<b>\$0.363 b</b>	<b>7,596</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding. The Dallas-Fort Worth area includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties. Student Spending is net incremental spending and includes spending by out-of-area students as well as an estimate of those who would leave the area for education in the absence of higher education facilities.

### The Annual Impact of Net Incremental Student Spending Associated with Medical Education Institutions on Business Activity in the Dallas-Fort Worth Area

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.002 b	\$0.001 b	\$0.000 b	7
Mining	\$0.003 b	\$0.001 b	\$0.000 b	2
Construction	\$0.007 b	\$0.003 b	\$0.003 b	38
Manufacturing	\$0.029 b	\$0.010 b	\$0.006 b	89
Transportation & Utilities	\$0.026 b	\$0.010 b	\$0.006 b	61
Information	\$0.009 b	\$0.006 b	\$0.002 b	21
Wholesale Trade	\$0.009 b	\$0.006 b	\$0.004 b	41
Retail Trade*	\$0.083 b	\$0.063 b	\$0.037 b	1,086
Financial Activities*	\$0.064 b	\$0.011 b	\$0.004 b	42
Business Services	\$0.012 b	\$0.007 b	\$0.006 b	70
Health Services	\$0.015 b	\$0.011 b	\$0.009 b	148
Other Services	\$0.028 b	\$0.015 b	\$0.012 b	242
<b>Total, All Industries</b>	<b>\$0.290 b</b>	<b>\$0.143 b</b>	<b>\$0.088 b</b>	<b>1,847</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding. The Dallas-Fort Worth area includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties. Student Spending is net incremental spending and includes spending by out-of-area students as well as an estimate of those who would leave the area for education in the absence of higher education facilities.

### The Annual Impact of Net Incremental Student Spending Associated with Community Colleges on Business Activity in the Dallas-Fort Worth Area

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.005 b	\$0.001 b	\$0.001 b	15
Mining	\$0.007 b	\$0.002 b	\$0.001 b	5
Construction	\$0.015 b	\$0.008 b	\$0.006 b	89
Manufacturing	\$0.068 b	\$0.023 b	\$0.013 b	207
Transportation & Utilities	\$0.061 b	\$0.023 b	\$0.013 b	141
Information	\$0.021 b	\$0.013 b	\$0.006 b	49
Wholesale Trade	\$0.022 b	\$0.015 b	\$0.009 b	95
Retail Trade*	\$0.193 b	\$0.146 b	\$0.085 b	2,518
Financial Activities*	\$0.149 b	\$0.025 b	\$0.009 b	97
Business Services	\$0.028 b	\$0.017 b	\$0.014 b	163
Health Services	\$0.035 b	\$0.025 b	\$0.021 b	342
Other Services	\$0.066 b	\$0.034 b	\$0.027 b	561
<b>Total, All Industries</b>	<b>\$0.672 b</b>	<b>\$0.332 b</b>	<b>\$0.205 b</b>	<b>4,283</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding. The Dallas-Fort Worth area includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties. Student Spending is net incremental spending and includes spending by out-of-area students as well as an estimate of those who would leave the area for education in the absence of higher education facilities.

### The Annual Impact of Net Incremental Student Spending Associated with Higher Education Institutions on Business Activity in the Dallas-Fort Worth Area

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.017 b	\$0.005 b	\$0.003 b	49
Mining	\$0.022 b	\$0.005 b	\$0.003 b	16
Construction	\$0.049 b	\$0.025 b	\$0.021 b	284
Manufacturing	\$0.218 b	\$0.073 b	\$0.041 b	664
Transportation & Utilities	\$0.196 b	\$0.074 b	\$0.043 b	452
Information	\$0.069 b	\$0.042 b	\$0.018 b	158
Wholesale Trade	\$0.071 b	\$0.048 b	\$0.028 b	306
Retail Trade*	\$0.618 b	\$0.467 b	\$0.272 b	8,069
Financial Activities*	\$0.478 b	\$0.080 b	\$0.030 b	310
Business Services	\$0.091 b	\$0.054 b	\$0.044 b	521
Health Services	\$0.113 b	\$0.080 b	\$0.068 b	1,097
Other Services	\$0.211 b	\$0.110 b	\$0.087 b	1,799
<b>Total, All Industries</b>	<b>\$2.154 b</b>	<b>\$1.064 b</b>	<b>\$0.656 b</b>	<b>13,726</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding. The Dallas-Fort Worth area includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties. Student Spending is net incremental spending and includes spending by out-of-area students as well as an estimate of those who would leave the area for education in the absence of higher education facilities.

### The Annual Impact of Net Incremental Student Spending Associated with Universities on Business Activity in Texas

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.025 b	\$0.007 b	\$0.005 b	72
Mining	\$0.021 b	\$0.005 b	\$0.003 b	16
Construction	\$0.031 b	\$0.016 b	\$0.013 b	182
Manufacturing	\$0.155 b	\$0.047 b	\$0.026 b	415
Transportation & Utilities	\$0.130 b	\$0.046 b	\$0.026 b	262
Information	\$0.038 b	\$0.024 b	\$0.010 b	89
Wholesale Trade	\$0.040 b	\$0.027 b	\$0.015 b	171
Retail Trade*	\$0.351 b	\$0.265 b	\$0.154 b	4,578
Financial Activities*	\$0.268 b	\$0.045 b	\$0.017 b	174
Business Services	\$0.051 b	\$0.030 b	\$0.025 b	292
Health Services	\$0.068 b	\$0.048 b	\$0.041 b	656
Other Services	\$0.122 b	\$0.064 b	\$0.051 b	1,080
<b>Total, All Industries</b>	<b>\$1.300 b</b>	<b>\$0.625 b</b>	<b>\$0.386 b</b>	<b>7,987</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding. Student Spending is net incremental spending and includes spending by out-of-area students as well as an estimate of those who would leave the area for education in the absence of higher education facilities.

### The Annual Impact of Net Incremental Student Spending Associated with Medical Education Institutions on Business Activity in Texas

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.006 b	\$0.002 b	\$0.001 b	18
Mining	\$0.005 b	\$0.001 b	\$0.001 b	4
Construction	\$0.008 b	\$0.004 b	\$0.003 b	44
Manufacturing	\$0.038 b	\$0.012 b	\$0.006 b	101
Transportation & Utilities	\$0.032 b	\$0.011 b	\$0.006 b	64
Information	\$0.009 b	\$0.006 b	\$0.002 b	22
Wholesale Trade	\$0.010 b	\$0.007 b	\$0.004 b	42
Retail Trade*	\$0.085 b	\$0.065 b	\$0.038 b	1,115
Financial Activities*	\$0.065 b	\$0.011 b	\$0.004 b	42
Business Services	\$0.012 b	\$0.007 b	\$0.006 b	71
Health Services	\$0.017 b	\$0.012 b	\$0.010 b	160
Other Services	\$0.030 b	\$0.016 b	\$0.012 b	263
<b>Total, All Industries</b>	<b>\$0.317 b</b>	<b>\$0.152 b</b>	<b>\$0.094 b</b>	<b>1,945</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding. Student Spending is net incremental spending and includes spending by out-of-area students as well as an estimate of those who would leave the area for education in the absence of higher education facilities.

### The Annual Impact of Net Incremental Student Spending Associated with Community Colleges on Business Activity in Texas

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.014 b	\$0.004 b	\$0.003 b	41
Mining	\$0.012 b	\$0.003 b	\$0.002 b	9
Construction	\$0.018 b	\$0.009 b	\$0.008 b	103
Manufacturing	\$0.087 b	\$0.027 b	\$0.015 b	234
Transportation & Utilities	\$0.074 b	\$0.026 b	\$0.015 b	148
Information	\$0.022 b	\$0.013 b	\$0.006 b	50
Wholesale Trade	\$0.022 b	\$0.015 b	\$0.009 b	97
Retail Trade*	\$0.198 b	\$0.150 b	\$0.087 b	2,586
Financial Activities*	\$0.151 b	\$0.025 b	\$0.010 b	98
Business Services	\$0.029 b	\$0.017 b	\$0.014 b	165
Health Services	\$0.038 b	\$0.027 b	\$0.023 b	370
Other Services	\$0.070 b	\$0.036 b	\$0.029 b	610
<b>Total, All Industries</b>	<b>\$0.735 b</b>	<b>\$0.353 b</b>	<b>\$0.218 b</b>	<b>4,511</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding. Student Spending is net incremental spending and includes spending by out-of-area students as well as an estimate of those who would leave the area for education in the absence of higher education facilities.

### The Annual Impact of Net Incremental Student Spending Associated with Higher Education Institutions on Business Activity in Texas

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.045 b	\$0.013 b	\$0.008 b	131
Mining	\$0.038 b	\$0.009 b	\$0.005 b	30
Construction	\$0.057 b	\$0.029 b	\$0.024 b	330
Manufacturing	\$0.280 b	\$0.086 b	\$0.048 b	751
Transportation & Utilities	\$0.236 b	\$0.084 b	\$0.047 b	473
Information	\$0.069 b	\$0.043 b	\$0.018 b	160
Wholesale Trade	\$0.071 b	\$0.048 b	\$0.028 b	310
Retail Trade*	\$0.635 b	\$0.479 b	\$0.279 b	8,279
Financial Activities*	\$0.484 b	\$0.081 b	\$0.031 b	314
Business Services	\$0.092 b	\$0.054 b	\$0.044 b	527
Health Services	\$0.123 b	\$0.087 b	\$0.073 b	1,186
Other Services	\$0.222 b	\$0.117 b	\$0.092 b	1,953
<b>Total, All Industries</b>	<b>\$2.352 b</b>	<b>\$1.130 b</b>	<b>\$0.698 b</b>	<b>14,443</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding. Student Spending is net incremental spending and includes spending by out-of-area students as well as an estimate of those who would leave the area for education in the absence of higher education facilities.

**Visitor Spending**



### The Annual Impact of Tourism and Visitor Spending Associated with Universities on Business Activity in the Dallas-Fort Worth Area

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.010 b	\$0.003 b	\$0.002 b	27
Mining	\$0.009 b	\$0.002 b	\$0.001 b	6
Construction	\$0.018 b	\$0.009 b	\$0.008 b	106
Manufacturing	\$0.121 b	\$0.040 b	\$0.022 b	359
Transportation & Utilities	\$0.118 b	\$0.070 b	\$0.045 b	570
Information	\$0.023 b	\$0.014 b	\$0.006 b	53
Wholesale Trade	\$0.038 b	\$0.026 b	\$0.015 b	164
Retail Trade*	\$0.359 b	\$0.263 b	\$0.152 b	4,715
Financial Activities*	\$0.147 b	\$0.039 b	\$0.015 b	151
Business Services	\$0.038 b	\$0.024 b	\$0.020 b	232
Health Services	\$0.027 b	\$0.019 b	\$0.016 b	262
Other Services	\$0.106 b	\$0.056 b	\$0.041 b	946
<b>Total, All Industries</b>	<b>\$1.015 b</b>	<b>\$0.565 b</b>	<b>\$0.341 b</b>	<b>7,591</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding. The Dallas-Fort Worth area includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties. Visitor Spending and Tourism includes estimated spending by visits to students and personnel and attendance at various events.

### The Annual Impact of Tourism and Visitor Spending Associated with Medical Education Institutions on Business Activity in the Dallas-Fort Worth Area

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.001 b	\$0.000 b	\$0.000 b	2
Mining	\$0.001 b	\$0.000 b	\$0.000 b	1
Construction	\$0.002 b	\$0.001 b	\$0.001 b	10
Manufacturing	\$0.011 b	\$0.004 b	\$0.002 b	33
Transportation & Utilities	\$0.011 b	\$0.006 b	\$0.004 b	52
Information	\$0.002 b	\$0.001 b	\$0.001 b	5
Wholesale Trade	\$0.003 b	\$0.002 b	\$0.001 b	15
Retail Trade*	\$0.033 b	\$0.024 b	\$0.014 b	430
Financial Activities*	\$0.013 b	\$0.004 b	\$0.001 b	14
Business Services	\$0.003 b	\$0.002 b	\$0.002 b	21
Health Services	\$0.002 b	\$0.002 b	\$0.001 b	24
Other Services	\$0.010 b	\$0.005 b	\$0.004 b	86
<b>Total, All Industries</b>	<b>\$0.092 b</b>	<b>\$0.051 b</b>	<b>\$0.031 b</b>	<b>691</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding. The Dallas-Fort Worth area includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties. Visitor Spending and Tourism includes estimated spending by visits to students and personnel and attendance at various events.

### The Annual Impact of Tourism and Visitor Spending Associated with Community Colleges on Business Activity in the Dallas-Fort Worth Area

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.000 b	\$0.000 b	\$0.000 b	1
Mining	\$0.000 b	\$0.000 b	\$0.000 b	0
Construction	\$0.000 b	\$0.000 b	\$0.000 b	2
Manufacturing	\$0.003 b	\$0.001 b	\$0.000 b	7
Transportation & Utilities	\$0.002 b	\$0.001 b	\$0.001 b	12
Information	\$0.000 b	\$0.000 b	\$0.000 b	1
Wholesale Trade	\$0.001 b	\$0.001 b	\$0.000 b	3
Retail Trade*	\$0.007 b	\$0.005 b	\$0.003 b	98
Financial Activities*	\$0.003 b	\$0.001 b	\$0.000 b	3
Business Services	\$0.001 b	\$0.000 b	\$0.000 b	5
Health Services	\$0.001 b	\$0.000 b	\$0.000 b	5
Other Services	\$0.002 b	\$0.001 b	\$0.001 b	20
<b>Total, All Industries</b>	<b>\$0.021 b</b>	<b>\$0.012 b</b>	<b>\$0.007 b</b>	<b>157</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding. The Dallas-Fort Worth area includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties. Visitor Spending and Tourism includes estimated spending by visits to students and personnel and attendance at various events.

### The Annual Impact of Tourism and Visitor Spending Associated with Higher Education Institutions on Business Activity in the Dallas-Fort Worth Area

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.012 b	\$0.003 b	\$0.002 b	30
Mining	\$0.010 b	\$0.002 b	\$0.001 b	7
Construction	\$0.019 b	\$0.010 b	\$0.009 b	117
Manufacturing	\$0.135 b	\$0.044 b	\$0.024 b	399
Transportation & Utilities	\$0.131 b	\$0.078 b	\$0.050 b	633
Information	\$0.026 b	\$0.016 b	\$0.007 b	59
Wholesale Trade	\$0.042 b	\$0.029 b	\$0.016 b	183
Retail Trade*	\$0.399 b	\$0.292 b	\$0.169 b	5,242
Financial Activities*	\$0.164 b	\$0.043 b	\$0.016 b	167
Business Services	\$0.043 b	\$0.027 b	\$0.022 b	258
Health Services	\$0.030 b	\$0.021 b	\$0.018 b	291
Other Services	\$0.118 b	\$0.062 b	\$0.045 b	1,052
<b>Total, All Industries</b>	<b>\$1.129 b</b>	<b>\$0.628 b</b>	<b>\$0.379 b</b>	<b>8,439</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding. The Dallas-Fort Worth area includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties. Visitor Spending and Tourism includes estimated spending by visits to students and personnel and attendance at various events.



### The Annual Impact of Tourism and Visitor Spending Associated with Universities on Business Activity in Texas

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.027 b	\$0.007 b	\$0.005 b	72
Mining	\$0.016 b	\$0.004 b	\$0.002 b	11
Construction	\$0.020 b	\$0.011 b	\$0.009 b	123
Manufacturing	\$0.152 b	\$0.046 b	\$0.025 b	402
Transportation & Utilities	\$0.136 b	\$0.075 b	\$0.047 b	580
Information	\$0.024 b	\$0.014 b	\$0.006 b	54
Wholesale Trade	\$0.038 b	\$0.026 b	\$0.015 b	166
Retail Trade*	\$0.367 b	\$0.269 b	\$0.156 b	4,823
Financial Activities*	\$0.150 b	\$0.039 b	\$0.015 b	152
Business Services	\$0.039 b	\$0.024 b	\$0.020 b	235
Health Services	\$0.032 b	\$0.022 b	\$0.019 b	305
Other Services	\$0.113 b	\$0.059 b	\$0.043 b	1,027
<b>Total, All Industries</b>	<b>\$1.114 b</b>	<b>\$0.598 b</b>	<b>\$0.362 b</b>	<b>7,952</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding. Visitor Spending and Tourism includes estimated spending by visits to students and personnel and attendance at various events.

### The Annual Impact of Tourism and Visitor Spending Associated with Medical Education Institutions on Business Activity in Texas

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.002 b	\$0.001 b	\$0.000 b	7
Mining	\$0.001 b	\$0.000 b	\$0.000 b	1
Construction	\$0.002 b	\$0.001 b	\$0.001 b	11
Manufacturing	\$0.014 b	\$0.004 b	\$0.002 b	37
Transportation & Utilities	\$0.012 b	\$0.007 b	\$0.004 b	53
Information	\$0.002 b	\$0.001 b	\$0.001 b	5
Wholesale Trade	\$0.003 b	\$0.002 b	\$0.001 b	15
Retail Trade*	\$0.033 b	\$0.025 b	\$0.014 b	439
Financial Activities*	\$0.014 b	\$0.004 b	\$0.001 b	14
Business Services	\$0.004 b	\$0.002 b	\$0.002 b	21
Health Services	\$0.003 b	\$0.002 b	\$0.002 b	28
Other Services	\$0.010 b	\$0.005 b	\$0.004 b	94
<b>Total, All Industries</b>	<b>\$0.102 b</b>	<b>\$0.054 b</b>	<b>\$0.033 b</b>	<b>724</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding. Visitor Spending and Tourism includes estimated spending by visits to students and personnel and attendance at various events.

### The Annual Impact of Tourism and Visitor Spending Associated with Community Colleges on Business Activity in Texas

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.001 b	\$0.000 b	\$0.000 b	1
Mining	\$0.000 b	\$0.000 b	\$0.000 b	0
Construction	\$0.000 b	\$0.000 b	\$0.000 b	3
Manufacturing	\$0.003 b	\$0.001 b	\$0.001 b	8
Transportation & Utilities	\$0.003 b	\$0.002 b	\$0.001 b	12
Information	\$0.000 b	\$0.000 b	\$0.000 b	1
Wholesale Trade	\$0.001 b	\$0.001 b	\$0.000 b	3
Retail Trade*	\$0.008 b	\$0.006 b	\$0.003 b	100
Financial Activities*	\$0.003 b	\$0.001 b	\$0.000 b	3
Business Services	\$0.001 b	\$0.001 b	\$0.000 b	5
Health Services	\$0.001 b	\$0.000 b	\$0.000 b	6
Other Services	\$0.002 b	\$0.001 b	\$0.001 b	21
<b>Total, All Industries</b>	<b>\$0.023 b</b>	<b>\$0.012 b</b>	<b>\$0.007 b</b>	<b>165</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding. Visitor Spending and Tourism includes estimated spending by visits to students and personnel and attendance at various events.

### The Annual Impact of Tourism and Visitor Spending Associated with Higher Education Institutions on Business Activity in Texas

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.030 b	\$0.008 b	\$0.005 b	81
Mining	\$0.017 b	\$0.004 b	\$0.002 b	12
Construction	\$0.023 b	\$0.012 b	\$0.010 b	137
Manufacturing	\$0.169 b	\$0.051 b	\$0.028 b	447
Transportation & Utilities	\$0.152 b	\$0.083 b	\$0.052 b	645
Information	\$0.026 b	\$0.016 b	\$0.007 b	60
Wholesale Trade	\$0.043 b	\$0.029 b	\$0.017 b	185
Retail Trade*	\$0.408 b	\$0.300 b	\$0.173 b	5,362
Financial Activities*	\$0.167 b	\$0.044 b	\$0.017 b	169
Business Services	\$0.043 b	\$0.027 b	\$0.022 b	262
Health Services	\$0.036 b	\$0.025 b	\$0.021 b	339
Other Services	\$0.126 b	\$0.066 b	\$0.048 b	1,142
<b>Total, All Industries</b>	<b>\$1.239 b</b>	<b>\$0.664 b</b>	<b>\$0.402 b</b>	<b>8,841</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding. Visitor Spending and Tourism includes estimated spending by visits to students and personnel and attendance at various events.

**Construction**

### The Impact of Typical Annual Construction Associated with Universities on Business Activity in the Dallas-Fort Worth Area

Industry	Total Expenditures	Gross Product	Personal Income	Person-Years of Employment*
Agriculture	\$0.008 b	\$0.002 b	\$0.001 b	23
Mining	\$0.012 b	\$0.003 b	\$0.002 b	11
Construction	\$0.430 b	\$0.193 b	\$0.159 b	2,184
Manufacturing	\$0.231 b	\$0.085 b	\$0.050 b	795
Transportation & Utilities	\$0.077 b	\$0.036 b	\$0.022 b	263
Information	\$0.026 b	\$0.016 b	\$0.007 b	60
Wholesale Trade	\$0.058 b	\$0.039 b	\$0.023 b	250
Retail Trade*	\$0.175 b	\$0.133 b	\$0.077 b	2,286
Financial Activities*	\$0.170 b	\$0.042 b	\$0.017 b	175
Business Services	\$0.071 b	\$0.044 b	\$0.036 b	431
Health Services	\$0.035 b	\$0.025 b	\$0.021 b	339
Other Services	\$0.066 b	\$0.034 b	\$0.027 b	627
<b>Total, All Industries</b>	<b>\$1.362 b</b>	<b>\$0.653 b</b>	<b>\$0.443 b</b>	<b>7,443</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. A person-year of employment is equivalent to one person working one job for one year. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding. The Dallas-Fort Worth area includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties.

### The Impact of Typical Annual Construction Associated with Medical Education Institutions on Business Activity in the Dallas-Fort Worth Area

Industry	Total Expenditures	Gross Product	Personal Income	Person-Years of Employment*
Agriculture	\$0.001 b	\$0.000 b	\$0.000 b	4
Mining	\$0.002 b	\$0.001 b	\$0.000 b	2
Construction	\$0.072 b	\$0.032 b	\$0.026 b	363
Manufacturing	\$0.038 b	\$0.014 b	\$0.008 b	132
Transportation & Utilities	\$0.013 b	\$0.006 b	\$0.004 b	44
Information	\$0.004 b	\$0.003 b	\$0.001 b	10
Wholesale Trade	\$0.010 b	\$0.006 b	\$0.004 b	42
Retail Trade*	\$0.029 b	\$0.022 b	\$0.013 b	380
Financial Activities*	\$0.028 b	\$0.007 b	\$0.003 b	29
Business Services	\$0.012 b	\$0.007 b	\$0.006 b	72
Health Services	\$0.006 b	\$0.004 b	\$0.003 b	56
Other Services	\$0.011 b	\$0.006 b	\$0.005 b	104
<b>Total, All Industries</b>	<b>\$0.226 b</b>	<b>\$0.108 b</b>	<b>\$0.074 b</b>	<b>1,237</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. A person-year of employment is equivalent to one person working one job for one year. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding. The Dallas-Fort Worth area includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties.

### The Impact of Typical Annual Construction Associated with Community Colleges on Business Activity in the Dallas-Fort Worth Area

Industry	Total Expenditures	Gross Product	Personal Income	Person-Years of Employment*
Agriculture	\$0.002 b	\$0.001 b	\$0.000 b	6
Mining	\$0.003 b	\$0.001 b	\$0.000 b	3
Construction	\$0.108 b	\$0.048 b	\$0.040 b	546
Manufacturing	\$0.058 b	\$0.021 b	\$0.013 b	199
Transportation & Utilities	\$0.019 b	\$0.009 b	\$0.006 b	66
Information	\$0.007 b	\$0.004 b	\$0.002 b	15
Wholesale Trade	\$0.014 b	\$0.010 b	\$0.006 b	62
Retail Trade*	\$0.044 b	\$0.033 b	\$0.019 b	571
Financial Activities*	\$0.043 b	\$0.010 b	\$0.004 b	44
Business Services	\$0.018 b	\$0.011 b	\$0.009 b	108
Health Services	\$0.009 b	\$0.006 b	\$0.005 b	85
Other Services	\$0.017 b	\$0.009 b	\$0.007 b	157
<b>Total, All Industries</b>	<b>\$0.341 b</b>	<b>\$0.163 b</b>	<b>\$0.111 b</b>	<b>1,861</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. A person-year of employment is equivalent to one person working one job for one year. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding. The Dallas-Fort Worth area includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties.

### The Impact of Typical Annual Construction Associated with All Higher Education Institutions on Business Activity in the Dallas-Fort Worth Area

Industry	Total Expenditures	Gross Product	Personal Income	Person-Years of Employment*
Agriculture	\$0.011 b	\$0.003 b	\$0.002 b	32
Mining	\$0.017 b	\$0.004 b	\$0.002 b	16
Construction	\$0.610 b	\$0.273 b	\$0.225 b	3,093
Manufacturing	\$0.328 b	\$0.120 b	\$0.071 b	1,125
Transportation & Utilities	\$0.110 b	\$0.051 b	\$0.031 b	372
Information	\$0.037 b	\$0.023 b	\$0.010 b	85
Wholesale Trade	\$0.082 b	\$0.055 b	\$0.032 b	354
Retail Trade*	\$0.248 b	\$0.188 b	\$0.109 b	3,237
Financial Activities*	\$0.241 b	\$0.059 b	\$0.024 b	247
Business Services	\$0.101 b	\$0.063 b	\$0.051 b	611
Health Services	\$0.050 b	\$0.035 b	\$0.030 b	481
Other Services	\$0.094 b	\$0.049 b	\$0.039 b	888
<b>Total, All Industries</b>	<b>\$1.929 b</b>	<b>\$0.925 b</b>	<b>\$0.627 b</b>	<b>10,541</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. A person-year of employment is equivalent to one person working one job for one year. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding. The Dallas-Fort Worth area includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties.

### The Impact of Typical Annual Construction Associated with Universities on Business Activity in Texas

Industry	Total Expenditures	Gross Product	Personal Income	Person-Years of Employment*
Agriculture	\$0.021 b	\$0.006 b	\$0.004 b	60
Mining	\$0.021 b	\$0.005 b	\$0.003 b	21
Construction	\$0.434 b	\$0.195 b	\$0.161 b	2,203
Manufacturing	\$0.288 b	\$0.099 b	\$0.058 b	901
Transportation & Utilities	\$0.098 b	\$0.041 b	\$0.024 b	275
Information	\$0.027 b	\$0.016 b	\$0.007 b	61
Wholesale Trade	\$0.058 b	\$0.039 b	\$0.023 b	253
Retail Trade*	\$0.188 b	\$0.142 b	\$0.083 b	2,444
Financial Activities*	\$0.175 b	\$0.043 b	\$0.017 b	178
Business Services	\$0.072 b	\$0.045 b	\$0.037 b	436
Health Services	\$0.042 b	\$0.029 b	\$0.025 b	398
Other Services	\$0.074 b	\$0.039 b	\$0.031 b	731
<b>Total, All Industries</b>	<b>\$1.496 b</b>	<b>\$0.700 b</b>	<b>\$0.472 b</b>	<b>7,961</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. A person-year of employment is equivalent to one person working one job for one year. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding.

### The Impact of Typical Annual Construction Associated with Medical Education Institutions on Business Activity in Texas

Industry	Total Expenditures	Gross Product	Personal Income	Person - Years of Employment*
Agriculture	\$0.003 b	\$0.001 b	\$0.001 b	10
Mining	\$0.004 b	\$0.001 b	\$0.001 b	3
Construction	\$0.072 b	\$0.032 b	\$0.027 b	366
Manufacturing	\$0.048 b	\$0.016 b	\$0.010 b	150
Transportation & Utilities	\$0.016 b	\$0.007 b	\$0.004 b	46
Information	\$0.004 b	\$0.003 b	\$0.001 b	10
Wholesale Trade	\$0.010 b	\$0.007 b	\$0.004 b	42
Retail Trade*	\$0.031 b	\$0.024 b	\$0.014 b	406
Financial Activities*	\$0.029 b	\$0.007 b	\$0.003 b	30
Business Services	\$0.012 b	\$0.007 b	\$0.006 b	72
Health Services	\$0.007 b	\$0.005 b	\$0.004 b	66
Other Services	\$0.013 b	\$0.006 b	\$0.005 b	122
<b>Total, All Industries</b>	<b>\$0.249 b</b>	<b>\$0.116 b</b>	<b>\$0.079 b</b>	<b>1,323</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. A person-year of employment is equivalent to one person working one job for one year. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding.

### The Impact of Typical Annual Construction Associated with Community Colleges on Business Activity in Texas

Industry	Total Expenditures	Gross Product	Personal Income	Person-Years of Employment*
Agriculture	\$0.005 b	\$0.001 b	\$0.001 b	15
Mining	\$0.005 b	\$0.001 b	\$0.001 b	5
Construction	\$0.108 b	\$0.049 b	\$0.040 b	551
Manufacturing	\$0.072 b	\$0.025 b	\$0.015 b	225
Transportation & Utilities	\$0.024 b	\$0.010 b	\$0.006 b	69
Information	\$0.007 b	\$0.004 b	\$0.002 b	15
Wholesale Trade	\$0.015 b	\$0.010 b	\$0.006 b	63
Retail Trade*	\$0.047 b	\$0.035 b	\$0.021 b	611
Financial Activities*	\$0.044 b	\$0.011 b	\$0.004 b	44
Business Services	\$0.018 b	\$0.011 b	\$0.009 b	109
Health Services	\$0.010 b	\$0.007 b	\$0.006 b	99
Other Services	\$0.019 b	\$0.010 b	\$0.008 b	183
<b>Total, All Industries</b>	<b>\$0.374 b</b>	<b>\$0.175 b</b>	<b>\$0.118 b</b>	<b>1,990</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. A person-year of employment is equivalent to one person working one job for one year. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding.

### The Impact of Typical Annual Construction Associated with All Higher Education Institutions on Business Activity in Texas

Industry	Total Expenditures	Gross Product	Personal Income	Person-Years of Employment*
Agriculture	\$0.029 b	\$0.008 b	\$0.006 b	86
Mining	\$0.030 b	\$0.008 b	\$0.004 b	30
Construction	\$0.614 b	\$0.276 b	\$0.227 b	3,121
Manufacturing	\$0.407 b	\$0.140 b	\$0.083 b	1,275
Transportation & Utilities	\$0.139 b	\$0.058 b	\$0.034 b	389
Information	\$0.038 b	\$0.023 b	\$0.010 b	87
Wholesale Trade	\$0.083 b	\$0.056 b	\$0.032 b	358
Retail Trade*	\$0.266 b	\$0.201 b	\$0.117 b	3,462
Financial Activities*	\$0.248 b	\$0.060 b	\$0.024 b	252
Business Services	\$0.102 b	\$0.064 b	\$0.052 b	618
Health Services	\$0.059 b	\$0.041 b	\$0.035 b	563
Other Services	\$0.105 b	\$0.055 b	\$0.044 b	1,036
<b>Total, All Industries</b>	<b>\$2.119 b</b>	<b>\$0.991 b</b>	<b>\$0.669 b</b>	<b>11,274</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. A person-year of employment is equivalent to one person working one job for one year. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding.

**Medical/University Research Impacts**





### The Annual Benefits of the Recent Research and Related Programs Associated with Medical Education Institutions on Business Activity in the Dallas-Fort Worth Area

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.012 b	\$0.007 b	\$0.006 b	37
Mining	\$0.070 b	\$0.035 b	\$0.017 b	50
Construction	\$0.123 b	\$0.073 b	\$0.061 b	705
Manufacturing	\$0.879 b	\$0.641 b	\$0.589 b	2,471
Transportation & Utilities	\$0.269 b	\$0.153 b	\$0.122 b	857
Information	\$0.106 b	\$0.081 b	\$0.054 b	254
Wholesale Trade	\$0.166 b	\$0.141 b	\$0.107 b	771
Retail Trade*	\$0.589 b	\$0.492 b	\$0.358 b	7,957
Financial Activities*	\$0.776 b	\$0.364 b	\$0.249 b	860
Business Services	\$0.250 b	\$0.196 b	\$0.172 b	1,608
Health Services	\$0.262 b	\$0.209 b	\$0.180 b	2,707
Other Services	\$0.691 b	\$0.600 b	\$0.577 b	2,531
<b>Total, All Industries</b>	<b>\$4.194 b</b>	<b>\$2.993 b</b>	<b>\$2.492 b</b>	<b>20,807</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding. The Dallas-Fort Worth area includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties.

### The Annual Benefits of the Recent Research and Related Programs Associated with Medical Education Institutions on Business Activity in Texas

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.073 b	\$0.041 b	\$0.036 b	218
Mining	\$0.258 b	\$0.129 b	\$0.060 b	170
Construction	\$0.131 b	\$0.077 b	\$0.065 b	749
Manufacturing	\$1.425 b	\$1.059 b	\$0.987 b	3,273
Transportation & Utilities	\$0.424 b	\$0.221 b	\$0.175 b	963
Information	\$0.113 b	\$0.086 b	\$0.058 b	270
Wholesale Trade	\$0.176 b	\$0.149 b	\$0.114 b	819
Retail Trade*	\$0.625 b	\$0.523 b	\$0.380 b	8,451
Financial Activities*	\$0.825 b	\$0.387 b	\$0.264 b	913
Business Services	\$0.266 b	\$0.208 b	\$0.182 b	1,708
Health Services	\$0.278 b	\$0.222 b	\$0.191 b	2,875
Other Services	\$0.750 b	\$0.653 b	\$0.629 b	2,700
<b>Total, All Industries</b>	<b>\$5.342 b</b>	<b>\$3.757 b</b>	<b>\$3.142 b</b>	<b>23,110</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding.

### The Annual Benefits of the Recent Research and Related Programs Associated with Medical Education Institutions on Business Activity in United States

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.102 b	\$0.050 b	\$0.045 b	307
Mining	\$0.341 b	\$0.166 b	\$0.074 b	229
Construction	\$0.173 b	\$0.096 b	\$0.082 b	988
Manufacturing	\$2.148 b	\$1.307 b	\$1.264 b	4,807
Transportation & Utilities	\$0.651 b	\$0.284 b	\$0.236 b	1,346
Information	\$0.146 b	\$0.105 b	\$0.068 b	349
Wholesale Trade	\$0.219 b	\$0.179 b	\$0.133 b	1,025
Retail Trade*	\$0.802 b	\$0.644 b	\$0.462 b	10,859
Financial Activities*	\$1.062 b	\$0.457 b	\$0.299 b	1,224
Business Services	\$0.343 b	\$0.257 b	\$0.228 b	2,218
Health Services	\$0.365 b	\$0.284 b	\$0.246 b	3,780
Other Services	\$0.871 b	\$0.724 b	\$0.698 b	3,566
<b>Total, All Industries</b>	<b>\$7.222 b</b>	<b>\$4.553 b</b>	<b>\$3.835 b</b>	<b>30,699</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding.

### The Annual Benefits of the Recent Research and Related Programs Associated with Universities on Business Activity in the Dallas/Fort Worth Area

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.003 b	\$0.001 b	\$0.001 b	14
Mining	\$0.010 b	\$0.003 b	\$0.002 b	12
Construction	\$0.025 b	\$0.013 b	\$0.011 b	143
Manufacturing	\$0.299 b	\$0.113 b	\$0.069 b	962
Transportation & Utilities	\$0.048 b	\$0.021 b	\$0.014 b	203
Information	\$0.017 b	\$0.011 b	\$0.005 b	47
Wholesale Trade	\$0.037 b	\$0.026 b	\$0.016 b	203
Retail Trade*	\$0.074 b	\$0.055 b	\$0.033 b	1,277
Financial Activities*	\$0.170 b	\$0.056 b	\$0.021 b	173
Business Services	\$0.053 b	\$0.035 b	\$0.032 b	376
Health Services	\$0.028 b	\$0.021 b	\$0.018 b	322
Other Services	\$0.049 b	\$0.023 b	\$0.020 b	490
<b>Total, All Industries</b>	<b>\$0.814 b</b>	<b>\$0.378 b</b>	<b>\$0.240 b</b>	<b>4,220</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding. The Dallas-Fort Worth area includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties.

### The Annual Benefits of the Recent Research and Related Programs Associated with Universities on Business Activity in Texas

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.012 b	\$0.004 b	\$0.002 b	46
Mining	\$0.022 b	\$0.006 b	\$0.003 b	25
Construction	\$0.027 b	\$0.014 b	\$0.011 b	160
Manufacturing	\$0.369 b	\$0.135 b	\$0.082 b	1,127
Transportation & Utilities	\$0.069 b	\$0.026 b	\$0.016 b	225
Information	\$0.018 b	\$0.012 b	\$0.005 b	50
Wholesale Trade	\$0.039 b	\$0.027 b	\$0.017 b	214
Retail Trade*	\$0.083 b	\$0.062 b	\$0.037 b	1,441
Financial Activities*	\$0.176 b	\$0.057 b	\$0.021 b	181
Business Services	\$0.054 b	\$0.036 b	\$0.033 b	389
Health Services	\$0.031 b	\$0.023 b	\$0.020 b	364
Other Services	\$0.053 b	\$0.026 b	\$0.022 b	567
<b>Total, All Industries</b>	<b>\$0.954 b</b>	<b>\$0.428 b</b>	<b>\$0.269 b</b>	<b>4,790</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding.

### The Annual Benefits of the Recent Research and Related Programs Associated with Universities on Business Activity in the US

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.018 b	\$0.005 b	\$0.003 b	66
Mining	\$0.028 b	\$0.008 b	\$0.004 b	33
Construction	\$0.031 b	\$0.016 b	\$0.013 b	197
Manufacturing	\$0.591 b	\$0.209 b	\$0.124 b	1,793
Transportation & Utilities	\$0.104 b	\$0.038 b	\$0.023 b	321
Information	\$0.023 b	\$0.014 b	\$0.007 b	64
Wholesale Trade	\$0.048 b	\$0.034 b	\$0.020 b	273
Retail Trade*	\$0.107 b	\$0.080 b	\$0.047 b	1,896
Financial Activities*	\$0.201 b	\$0.065 b	\$0.025 b	225
Business Services	\$0.063 b	\$0.041 b	\$0.037 b	462
Health Services	\$0.037 b	\$0.027 b	\$0.023 b	437
Other Services	\$0.066 b	\$0.032 b	\$0.027 b	740
<b>Total, All Industries</b>	<b>\$1.315 b</b>	<b>\$0.569 b</b>	<b>\$0.354 b</b>	<b>6,506</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding.

## Medical and University Graduates



### The Estimated Annual Impact of Employed Graduates of Local Medical Education Institutions on Business Activity in the Dallas/Fort Worth Area

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.095 b	\$0.025 b	\$0.017 b	265
Mining	\$0.107 b	\$0.025 b	\$0.013 b	78
Construction	\$0.235 b	\$0.125 b	\$0.103 b	1,409
Manufacturing	\$1.484 b	\$0.497 b	\$0.279 b	4,473
Transportation & Utilities	\$0.798 b	\$0.344 b	\$0.206 b	2,349
Information	\$0.290 b	\$0.179 b	\$0.076 b	669
Wholesale Trade	\$0.462 b	\$0.313 b	\$0.180 b	2,001
Retail Trade*	\$1.813 b	\$1.355 b	\$0.787 b	23,711
Financial Activities*	\$2.017 b	\$0.527 b	\$0.198 b	2,033
Business Services	\$0.555 b	\$0.337 b	\$0.275 b	3,266
Health Services	\$4.333 b	\$2.935 b	\$2.482 b	40,056
Other Services	\$0.732 b	\$0.379 b	\$0.302 b	6,867
<b>Total, All Industries</b>	<b>\$12.922 b</b>	<b>\$7.040 b</b>	<b>\$4.918 b</b>	<b>87,176</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding. The Dallas-Fort Worth area includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties.

### The Estimated Annual Impact of Employed Graduates of Local Medical Education Institutions on Business Activity in Texas

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.476 b	\$0.130 b	\$0.086 b	1,332
Mining	\$0.351 b	\$0.082 b	\$0.046 b	271
Construction	\$0.526 b	\$0.279 b	\$0.230 b	3,158
Manufacturing	\$3.708 b	\$1.155 b	\$0.639 b	9,818
Transportation & Utilities	\$2.011 b	\$0.775 b	\$0.446 b	4,768
Information	\$0.567 b	\$0.350 b	\$0.149 b	1,307
Wholesale Trade	\$0.899 b	\$0.608 b	\$0.351 b	3,891
Retail Trade*	\$3.690 b	\$2.760 b	\$1.603 b	48,250
Financial Activities*	\$3.942 b	\$1.023 b	\$0.385 b	3,945
Business Services	\$1.080 b	\$0.655 b	\$0.534 b	6,353
Health Services	\$8.465 b	\$5.729 b	\$4.844 b	78,187
Other Services	\$1.565 b	\$0.811 b	\$0.651 b	15,273
<b>Total, All Industries</b>	<b>\$27.279 b</b>	<b>\$14.359 b</b>	<b>\$9.965 b</b>	<b>176,553</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding. \*

### The Estimated Annual Impact of Employed Graduates of Local Universities on Business Activity in the Dallas-Fort Worth Area

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$0.895 b	\$0.239 b	\$0.161 b	2,495
Mining	\$5.853 b	\$1.317 b	\$0.639 b	3,433
Construction	\$2.675 b	\$1.417 b	\$1.167 b	16,023
Manufacturing	\$23.679 b	\$8.703 b	\$5.097 b	70,950
Transportation & Utilities	\$10.298 b	\$4.114 b	\$2.425 b	27,085
Information	\$5.599 b	\$3.461 b	\$1.477 b	12,933
Wholesale Trade	\$3.856 b	\$2.608 b	\$1.504 b	16,691
Retail Trade*	\$13.412 b	\$9.979 b	\$5.787 b	175,569
Financial Activities*	\$39.462 b	\$13.161 b	\$4.719 b	45,891
Business Services	\$12.138 b	\$7.763 b	\$6.333 b	75,289
Health Services	\$5.820 b	\$3.987 b	\$3.371 b	54,418
Other Services	\$6.841 b	\$3.622 b	\$2.931 b	67,030
<b>Total, All Industries</b>	<b>\$130.528 b</b>	<b>\$60.372 b</b>	<b>\$35.612 b</b>	<b>567,806</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding. The Dallas-Fort Worth area includes Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Erath, Hood, Johnson, Somervell, Ellis, and Navarro Counties.

### The Estimated Annual Impact of Employed Graduates of Local Universities on Business Activity in Texas

Industry	Total Expenditures	Gross Product	Personal Income	Permanent Jobs
Agriculture	\$2.810 b	\$0.771 b	\$0.510 b	7,884
Mining	\$8.170 b	\$1.853 b	\$0.924 b	5,064
Construction	\$3.751 b	\$1.986 b	\$1.636 b	22,459
Manufacturing	\$33.454 b	\$11.645 b	\$6.764 b	92,685
Transportation & Utilities	\$15.309 b	\$5.633 b	\$3.226 b	34,177
Information	\$6.811 b	\$4.210 b	\$1.797 b	15,733
Wholesale Trade	\$4.715 b	\$3.189 b	\$1.839 b	20,407
Retail Trade*	\$17.286 b	\$12.876 b	\$7.470 b	226,219
Financial Activities*	\$47.994 b	\$15.937 b	\$5.716 b	55,603
Business Services	\$14.716 b	\$9.407 b	\$7.674 b	91,233
Health Services	\$7.616 b	\$5.224 b	\$4.417 b	71,297
Other Services	\$9.065 b	\$4.790 b	\$3.893 b	91,074
<b>Total, All Industries</b>	<b>\$171.698 b</b>	<b>\$77.521 b</b>	<b>\$45.866 b</b>	<b>733,834</b>

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values in billions of 2018 US dollars. Retail Trade includes restaurants, Financial Activities includes Real Estate. Components may not sum due to rounding.