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The Perryman Report & Texas Letter

IN THIS ISSUE

SPECIAL REPORT

Texas as a "State of Minds"

INTRODUCTION

Residents, new and old alike, often refer to Texas as a "state of mind." There is little doubt that this large and rugged land that was once an independent country has a personality and character all its own. In the future, however, it is critical that Texas enhance its current economic base and evolve in a manner that can consistently achieve and sustain global business leadership. The state that carved its early success out of a vast base of natural resources has adapted to new realities, but much remains to be done. To assure future prosperity, the "state of mind" must become the "state of minds" – the very best and brightest for generations to come.

Education is a key factor of success not only for individuals, but also for local and state economies. In an increasingly competitive US and international market, nationally recognized, top-quality academic research universities are critical to securing a highly skilled workforce, creating and dispersing knowledge, cultivating entrepreneurship and associated capital investment, attracting activity in high-growth sectors, and promoting economic development.

Texas, home to some 24 million people and growing, lags behind other populous states in the number of Top Tier, nationally recognized research universities. As a result, the state and local economies are unable to realize the full economic potential of the state's university system. In fact, Texas lags its primary competitors both in per-capita output of technology-oriented goods and services and in the growth rate for these sectors. In other words, a notable gap exists, and it is getting wider over time.

Top Tier universities typically involve larger and more highly compensated faculties; additional research and associated activity funded primarily through federal and other external sources; a greater volume of spin-off companies, venture capital sources, and licensing opportunities; and a more highly qualified workforce to support technology-oriented growth.

Texas is presently losing critical young talent as top high school graduates leave the state to attend recognized universities in other states. In fact, an estimated 10,000 high school graduates per year leave the state to attend doctoral granting universities in other states, more than double the approximately 4,000 attracted to Texas. A disproportionate share of these students normally remains near the area where they attend college. The reversal of this "brain drain" is critical to the future of Texas. In key workforce categories (particularly in science and engineering), Texas lags other states such as California and Massachusetts, thus

hampering the outlook for future performance.

In short, nationally recognized research universities attract the world's most talented students and faculty and produce significant economic impacts through research, spin-off enterprises, and enhanced competitiveness in locating emerging technology clusters.

In November, Texas voters approved an important measure to improve the Lone Star State's position in this arena: Proposition 4. This Texas constitutional amendment allows for the creation of a National Research University Fund, among other things, to help fund state universities meeting certain quality requirements for the purpose of becoming nationally recognized research institutions. Started through the transfer of existing assets of the Higher Education Fund, worth roughly $450 million, the National Research University Fund is expected to reach $2 billion by the time the first emerging institution becomes eligible to receive distributions, allowing for a total of $25 million per year for qualifying universities.

The University of Texas at Austin and Texas A&M at College Station are the only public schools currently classified as Tier One universities. (Rice University in Houston, a relatively small private institution, is also nationally recognized.) Seven public universities have been classified as "emerging research universities" with the potential of receiving the above funds including:

- Texas Tech University,
- University of Texas at Arlington,
- University of Texas at Dallas,
- University of Texas at El Paso,
- University of Texas at San Antonio,
- University of Houston, and
- University of North Texas.

Overall, the advancement of some of these institutions to Tier One standing would generate a large potential economic impact for the state. Texas has a number of positive attributes and is projected to achieve ongoing expansion under current conditions. The incremental benefits of pursuing an aggressive strategy to promote high-quality educational institutions, however, are quite substantial and worthy of aggressive pursuit.

In advance of the election, The Perryman Group (TPG) studied the potential effects of a concerted effort to develop additional Tier One universities on the Texas economy. This analysis was provided as a public service to illustrate the importance of this critical investment in the "intellectual infrastructure" of the state. Findings from the analysis were used to help explain the economic benefits to voters.

TEXAS' CURRENT STANDING

Current Tier One Institutions

While there is no single universal definition of a Tier One university, membership in the Association of American Universities is one common criterion. The Tier One designation represents institutions that dominate in research funding, endowment assets, and doctorates awarded. These foremost research institutions attract the most talented students and faculty, resulting in increased positive impacts for the states in which they are located.

Among the 60 US universities with memberships in the AAU, three are located in Texas, of which two are large public universities.

- University of Texas at Austin
- Texas A&M University
- Rice University

These universities make important contributions to the local and state economy through numerous channels including:

- retaining and attracting outstanding young people to contribute to the state's future prosperity,
- adding to the local employment base,
- creating new business opportunities,
- producing innovative discoveries and technologies,
- generating research investments, and
- contributing to competitiveness for desirable economic activity.

Nationally recognized research universities tend to attract talented students. The estimated median SAT scores (cumulative verbal and math scores only) for Tier One universities around the nation in 2007 was 1,290 (1,405 for private and 1,202 for public institutions). Texas Tier One universities had an estimated median score of 1,280 compared to 1,049 for all universities in Texas. Texas' Tier One public universities had an estimated median score of 1,205 compared to an average of 1,001 for other public universities in Texas. While SAT scores are only one measure of quality, Tier One universities consistently average higher SAT scores, one indication of the caliber of students they attract. They also tend to enroll a high percentage of students from the top 10% of their classes relative to other schools.

In addition, these individuals often remain in the area after they graduate. Only 15% of Rice freshmen, for example, are from Harris County, while 33% of the alumni live in Harris County, thus leading to a net influx of highly educated workers.

Research institutions also play a key role in the growth of high-tech industries in the area, as seen with electronics and software in Austin or the diverse mix of emerging growth sectors in the Silicon Valley area of California and the Boston urban region. Major research universities

often partner with local firms to facilitate the creation of industry clusters. As an example, the University of Texas at Austin has agreements with Texas businesses generating in excess of $9.5 million annually in licensing income. The venture capital required to commercialize research also tends to concentrate around Tier One universities.

Research Funding

An important aspect of having a top tier university system is research expenditures. Not only do research expenditures benefit the institution itself, they also benefit the surrounding community, particularly if they are derived from federal grants or other external sources.

While universities of all sizes engage in research, Tier One typically involves research budgets topping $100 million. In fact, federal academic research expenditures at AAU members totaled $17.2 billion in FY2007, 57% of all federally funded research provided to colleges and universities throughout the nation. Money invested in research has a multiplying effect throughout the local economy emanating both from the spending itself and its capacity to catalyze new forms.

Texas currently lags other areas in this arena. Among Tier One universities in Texas, the per capita research expenditures in 2007 totaled $143 per person, ranking it at the lower end of per-capita research expenditures in the most populous US states. Only Florida, which has a notably different economic base, was significantly lower.

One analysis, based solely on population proportion to the US, found that Texas bypasses $3.7 billion annually in federal research and development funding and venture capital investment relative to its "fair share" on a demographic basis. Increasing the number of Tier One universities would help to bring outside research and development funding for Texas more in line with the proportion of the state's population, thus increasing research expenditures and benefiting the local and state economies.

Texas Tier One Universities Compared to Other Key States

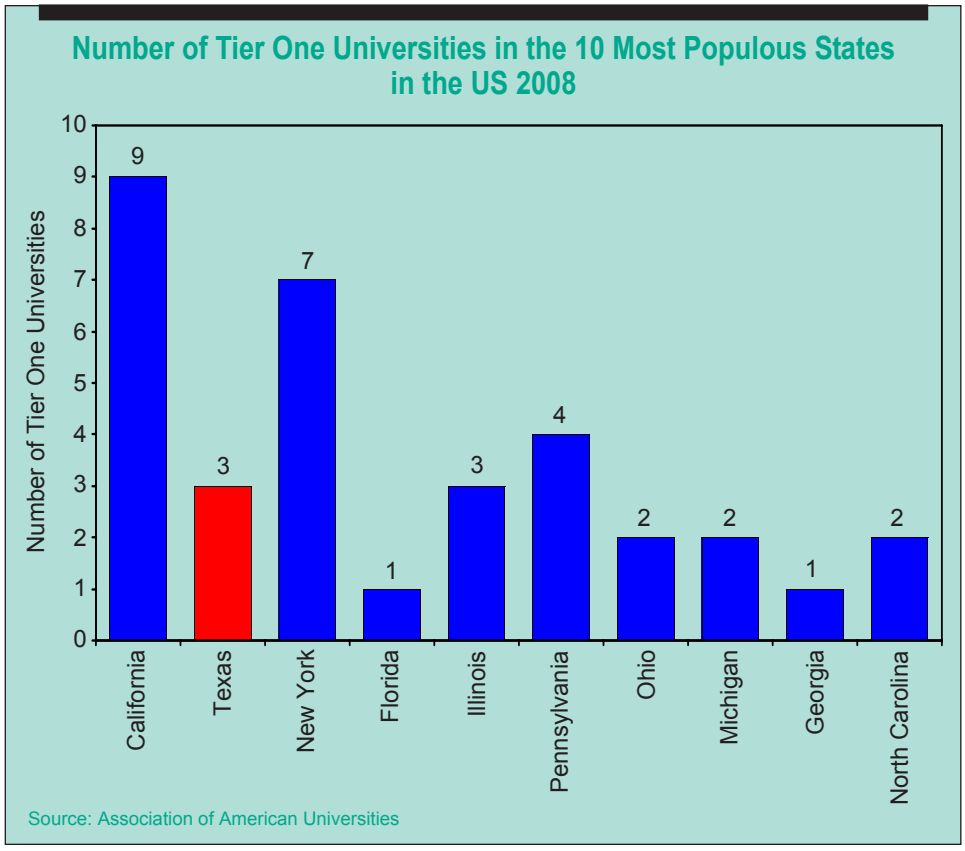
Texas has not kept pace with other large states in the number of Tier One universities. California, with the nation's largest population, is home to nine Tier One universities and New York, with the nation's third largest population, is home to seven. Pennsylvania, holding the sixth largest population, has four Tier One universities, while Texas, the second most populous state, has only three, the same number as the fifth most populated state in the nation. In fact, Massachusetts, a much smaller state that is a primary competitor for major corporate activity, also has three such institutions.

The number of residents per Tier One university in Texas is high, over 8,000,000, ranking it third to last of the ten most populous states, demonstrating the lack of top tier universities in Texas in relation to the size of the population.

As will be demonstrated in detail below, Texas' adverse ranking in terms of nationally recognized, Tier One, research universities has notable negative consequences for the economy including lost opportunity for billions of dollars in research funding and an out-migration of the bright high school graduates, as well as disadvantages in generating startup firms in emerging fields and attracting major clusters of technology-oriented production. In addition, the lack of nationally recognized research universities has even been shown to diminish university attendance more generally.

Texas Higher Education

There are currently 143 institutions of higher learning, both public and



private, in the state of Texas. Yet, a large and growing population and a currently low ranking educational attainment, compared with the national average, has highlighted the significance of higher education for Texas individuals and the state economy.

The Texas Higher Education Coordinating Board has set goals to increase postsecondary education throughout the state. More high performing, nationally recognized research universities will help obtain those goals and keep the best students in Texas.

> ***"Texas has not kept pace with other large states in the number of Tier One universities."***

In 2000, the state adopted Closing the Gaps by 2015: The Texas Higher Education Plan, meant to close the gap between Texas colleges and universities and higher education institutions in other top performing states as well as close the gap between educational attainment of different ethnic groups within the state.

In a study several years ago, The Perryman Group estimated that achieving these goals would result in billions of additional spending throughout the state as well as over one million new jobs by 2030. Overall, the state's return on higher education investment through Closing the Gaps by 2015 would be $8.08 for every $1 invested.

Clearly, growing all types of colleges and universities will positively impact the economy and personal accomplishments of individual Texans. Transforming currently emerging universities into nationally recognized research (Tier One) universities will result in even greater gains.

IMPACT OF RESEARCH INSTITUTIONS

Impact of Research Institutions on Economies

The impact of research institutions on economies is immense. Tier One research universities are often large, creating thousands of jobs in the local economy. Spending generated through faculty/staff, students, and visitors contribute greatly to the local economy.

Tier One universities draw in talented students from around the world, many of whom remain in the local area after graduation and play important roles in business formation and economic growth. For example, Massachusetts is home to an estimated 6,900 Massachusetts Institute of Technology (MIT) alumni firms. While only 10% of MIT freshmen are from Massachusetts, more than 38% of the software, biotech, and electronics companies founded by MIT graduates are located in Massachusetts.

The University of California San Diego, just one of six AAU ranked campuses of the University of California system, has annual research expenditures of nearly $800 million, generating 373 new inventions, 64 patents, and 85 license agreements.

Nationally recognized research universities also attract highly talented faculty. On average, each full-time faculty position at the University of Virginia generates some $100,000 in sponsored research funding, the majority of which comes from sources outside the state. Patent income in 2004 to 2005 at the university generated in excess of $6 million in revenue. Patent revenue is reinvested in faculty as well as faculty entrepreneurial efforts throughout the community.

Aside from the economic contributions of running the actual institution, Tier One research universities spend millions of dollars annually on research, much of which is funded from outside sources. They are leaders in innovative ideas and new creations and discoveries. They partner with local businesses and produce graduates that create a highly trained workforce in the area. The implications of a greater concentration of such academic enclaves are explored below.

IMPACT OF INCREASING THE NUMBER OF TIER ONE UNIVERSITIES ON THE TEXAS ECONOMY

As noted, allowing existing funds to be used to further the goal of transforming high-performing universities in the state into nationally recognized (Tier One) universities would lead to sizable economic gains.

The Perryman Group analyzed the incremental benefit of the potential enhancement of the state's position in Tier One universities.

Impacts Measured in this Study

The methods used in this study include dynamic input-output assessment, which 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.

Impacts are expressed in terms of key measures of business activity. In essence, total expenditures (or total spending) reflect every dollar that changes hands in the local area

as a result of the stimulus. Gross product (or output) is the amount of new production of goods and services that will come into the relevant area as a result of the new activity. Personal income is dollars that end up in the hands of people in the area; the vast majority of this derives from the earnings of employees, but payments such as interest and rents are also included. Job gains are expressed in either person-years of employment (for a temporary effect such as construction) or permanent jobs (for an ongoing impact). In the present instance, only permanent changes are considered although it is recognized that other benefits (such as the construction of new facilities) will occur.

For the emerging research universities to evolve from their present status to Tier One will require a substantial time period. Thus, the present analysis focuses on the incremental benefits in 2035. All values are expressed in constant (2009) dollars and, where appropriate, adjusted for anticipated baseline gains in productivity as estimated in the Texas Econometric Model. It should be noted, of course, that benefits begin to accrue as the institutions move toward nationally-recognized research status.

In order to assess the implications of additional Tier One universities, it is initially necessary to establish a benchmark for comparison. For this purpose, TPG used a group consisting of public university AAU members other than very large state institutions with much higher enrollment levels than the seven emerging universities in Texas. These peer institutions, a total of twenty-one, have almost exactly the same average number of students, thus allowing comparisons of the current status of the Texas schools in key performance metrics (research funding, faculty, doctoral students, quality of undergraduates, etc.). In this way, it is possible to compare the typical emerging Texas university to the typical Tier One institution of comparable size to determine the incremental activity that needs to occur to achieve this stature.

The gains measured in the current analysis are only those that are incremental as a result of the enhanced university status. Specifically, these benefits include:

- a larger number of faculty members per student due to the increased emphasis on research and graduate education;
- a higher level of research per faculty member, with a greater percentage of the funds coming from external sources;
- incremental startup companies resulting from the greater research emphasis;
- enhanced production of existing firms due to the availability of new technologies and processes; and
- economic development resulting from a more highly skilled workforce and greater opportunities for effective collaboration between universities and industry.

Note that no incremental impacts are assumed for increased enrollment, as it is not apparent that the size of the student body will be affected by the efforts to achieve Tier One status over and above that which would occur as a result of normal demographic patterns. The effects of achieving a higher number of undergraduate students and a greater concentration in graduate programs are implicit reflected in the outcomes noted above.

One of the channels of economic impact measured by TPG was that associated with the incremental increase in faculty needed to reach the level typical for Tier One universities of comparable size. Specifically, the emerging research universities would need to increase faculty by about 67% to be on a par with their nationally recognized peers. This incremental payroll leads to a larger impact on the economy. For this segment of the analysis, it was assumed that average salaries would be equal to those at public Tier One universities in Texas, which are approximately equal to (slightly below) national norms once adjusted for cost-of-living differentials. The additional spending was assumed to be typical for the state in terms of allocation and was fully adjusted to reflect taxes and other leakages. It should also be observed that the increase in faculty would need to be supported by additional staff. Since much of this segment is likely to be supported by external research funding, however, it was not considered separately to avoid potential overlap in impacts.

In addition to having a larger faculty, nationally recognized universities receive a much greater volume of research funding per faculty member. In particular, the average amount at the peer institutions is almost four times as great as currently observed at the seven emerging

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Texas universities. Moreover, the professors at Tier One schools derive a greater percentage of their funds from external sources (primarily federal grants). Using the peer group information and data compiled by the AAU, it is possible to determine the incremental funds entering the state as a result of enhanced research emphasis and, thus, to estimate its effects on the economy.

As noted, a greater volume of research leads to a larger number of startup companies. Using data compiled by the Association of University Technology Managers (AUTM) and the incremental research outlays determined above, it is possible to estimate the incremental number of companies likely to be formed as a result of increased research funding. The information also permits estimates of (1) the attrition rate of the firms and (2) the proportion likely to remain in the state. In order to calculate the level in 2035, it was assumed that research funding would grow from current levels to the amounts in a typical peer Tier One university at a constant rate. Given the stimulus provided by Proposition 4, this pattern is likely to be conservative. It was further assumed that the resulting firms would be of average size (as determined by data from the US Department of Commerce) and follow the current composition of technology-oriented firms within the state.

In addition to fostering startups, the enhanced level of research also leads to new products and cost savings through improved processes for existing firms. While much of this benefit occurs outside the state, recent research at MIT and elsewhere suggests that a notable share occurs in the state of origin. This effect was measured using the pioneering and widely accepted work by Edwin Mansfield to measure the rate of return to academic research among existing firms on a conservative basis.

Finally, the combination of an enhanced research environment and a higher quality workforce in key technological areas provides a competitive advantage in attracting new activity in emerging growth clusters. As noted earlier, Texas currently lags both California and (especially) Massachusetts in per-capita production of high-tech goods and services, and the gap is widening over time. Texas offers a better cost and overall business climate than either of these areas according to numerous measures. The shortfall is the result of a lesser commitment to research and the ability to provide concentrations of high-tech workers. In fact, the Austin area, which has been able to leverage the benefits of a major Tier One university, has achieved performance on a par with these areas. As a part of this analysis, the potential benefits of gaining "market share" in these critical sectors for future prosperity are examined. In each instance, only the increment above baseline projected growth is considered.

To illustrate the benefits of securing a greater number of nationally-recognized research universities, TPG developed the following three scenarios:

Potential Annual Impact of an Ongoing Investment in Achieving Tier One Status for Higher Education Institutions on Business Activity (Monetary Values in Billions of 2009 Dollars)

	Scenario I: Texas adds Two Tier Ones and Closes Half the Gap with California in Emerging Sectors		**Scenario II:** Texas adds Three Tier Ones and Equals California in Emerging Sectors		**Scenario III:** Texas adds Four Tier Ones and Reaches Average of California and Massachusetts in Emerging Sectors	
	US	**Texas**	**US**	**Texas**	**US**	**Texas**
Total Expenditures	$194.064	$161.125	$383.397	$320.478	$717.407	$603.332
Gross Product	$93.653	$81.792	$185.335	$162.764	$347.326	$306.553
Personal Income	$58.868	$51.810	$116.529	$103.101	$218.434	$194.186
Retail Sales	$20.834	$19.730	$41.257	$39.253	$77.364	$73.916
Employment	387,497	344,393	766,534	684,954	1,436,004	1,289,419
State Taxes		$4.2		$8.4		$15.9
Local Taxes		$1.3		$2.6		$4.9

Source: The Perryman Group

- In Scenario I, it is assumed that (1) Texas is able to add two typical Tier One universities by 2035, which will bring the state to the national average on a per-capita basis and (2) the resulting benefits lead to closing half the gap with California in per-capita output in emerging sectors.
- In Scenario II, it is assumed that (1) Texas is able to add three typical Tier One universities by 2035, which will bring the state to the average of the ten largest states (excluding Florida) on a per-capita basis and (2) the resulting benefits lead to closing the current gap with California in per-capita output in emerging sectors.
- In Scenario III, it is assumed that (1) Texas is able to add four typical Tier One universities by 2035, which will bring the state approximately to the average of California and Massachusetts on a per-capita basis and (2) the resulting benefits lead to per-capita output in emerging sectors equivalent to the average for California and Massachusetts.

Because some of the benefits from these investments occur in other parts of the country, both national and state impacts are presented.

- For Scenario I, incremental business activity in Texas as of 2035 includes $161.1 billion in total spending each year, $81.8 billion in annual output, and 344,393 permanent jobs. The State government would gain more than $4.2 billion in annual fiscal revenues, with local tax authorities seeing benefits of about $1.3 billion per annum. As noted earlier, all monetary values are given in constant (2009) dollars.
- In Scenario II, gains in Texas business activity as of 2035 rise to $320.5 billion in spending each year, $162.8 billion in annual output, and 684,954 permanent jobs. Similarly, fiscal revenues expand to $8.4 billion for the State and nearly $2.6 billion for local governments.
- Scenario III yields overall gains in incremental business activity by 2035 of $603.3 billion in total spending per year, $306.6 billion in output, and 1,289,419 permanent jobs, which allows revenues to the State and local governments to expand by $15.9 billion and almost $4.9 billion per annum, respectively.

Proposition 4 permits resources to be available to the seven emerging universities to work toward Tier One recognition without any additional tax dollars being required. It is appropriate to note, however, that the peer groups of nationally-recognized institutions receive substantially more State money than is currently provided to the Texas schools, and such funding would likely be necessary to sustain national research leadership. Assuming that the level of support per student rose to the average of the peer institutions, the State would gain $17.25 for every dollar committed under Scenario I, $23.02 for every dollar under Scenario II, and $32.51 for every dollar under Scenario III.

The payoffs to the economy as a whole are even more dramatic, ranging from $334.55 in gross product per dollar of State funding in Scenario I, to $443.83 in Scenario II, and $626.93 in Scenario III.

CONCLUSION

The state currently lags behind other populated states in Tier One research universities. As the second most populated state, Texas is home to just three Tier One universities, compared to nine in California and seven in New York. The lack of Tier One universities throughout the state results in Texas receiving lower funding for research, an out migration of the top students graduating from high school, and missed economic opportunities.

The passage of Proposition 4 is an important stride toward long-term prosperity for Texas. The National Research University Fund investment in emerging research universities can help them to reach Tier One status (though more remains to be done to further enhance funding for higher education in the state).

If four of the seven emerging research universities could attain Tier One status by 2035, the impact on the Texas economy (in constant 2009 dollars) could reach up to $603.3 billion in total spending per year, $306.6 billion in output, and 1,289,419 permanent jobs. Even if only two are successful, incremental activity would include an estimated $161.1 billion in total spending each year, $81.8 billion in annual output, and 344,393 permanent jobs.

Using existing funds to further the goal of achieving nationally recognized (Tier One) status of high-performing universities can lead to enhanced opportunities for individuals, facilitate the economically and socially desirable goal of increasing the education level of the state residents, and generate sizable economic gains. If the program is successful, the payoff to the investment of public resources is enormous.

Texas will always be a "state of mind." As a "state of minds," however, it is characterized by much greater prosperity and competitiveness on a sustainable basis. The importance of Proposition 4 as an initial catalyst to this outcome cannot be overemphasized. ■

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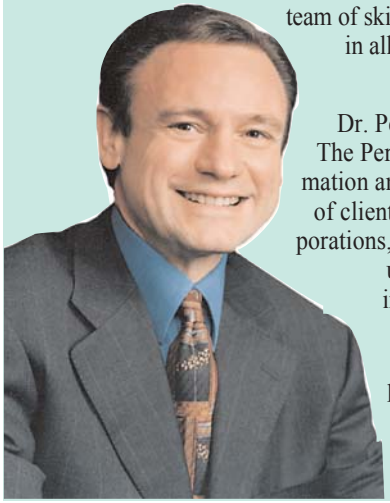

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