

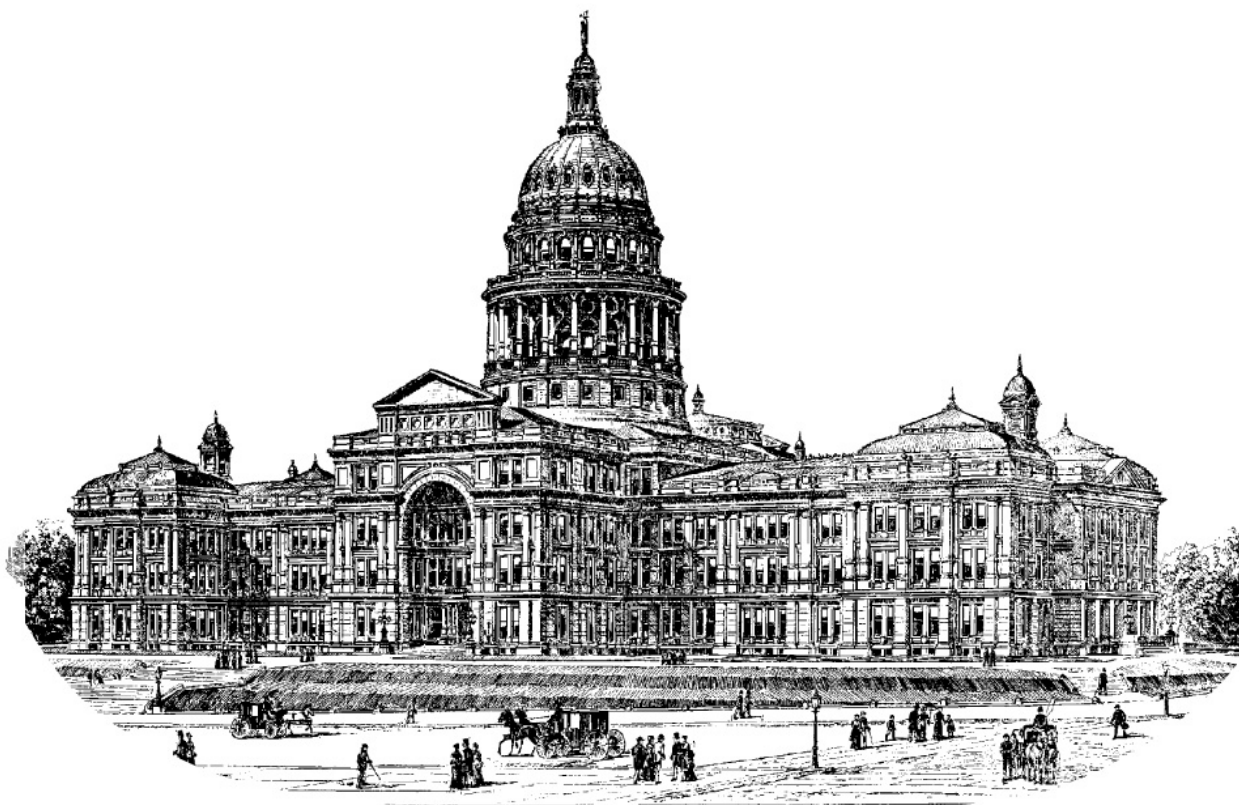


# INTERIM REPORT

## TO THE 83RD TEXAS LEGISLATURE

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HOUSE COMMITTEE ON  
**ECONOMIC AND SMALL BUSINESS DEVELOPMENT**  
DECEMBER 2012

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**HOUSE COMMITTEE ON ECONOMIC AND SMALL BUSINESS DEVELOPMENT  
TEXAS HOUSE OF REPRESENTATIVES  
INTERIM REPORT 2012**

**A REPORT TO THE  
HOUSE OF REPRESENTATIVES  
83RD TEXAS LEGISLATURE**

**JOHN E. DAVIS  
CHAIRMAN**

**COMMITTEE CLERK  
LAURIE MCANALLY**

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Committee On  
Economic and Small Business Development

December 3, 2012

John E. Davis  
Chairman

P.O. Box 2910  
Austin, Texas 78768-2910

The Honorable Joe Straus  
Speaker, Texas House of Representatives  
Members of the Texas House of Representatives  
Texas State Capitol, Rm. 2W.13  
Austin, Texas 78701

Dear Mr. Speaker and Fellow Members:

The Committee on Economic and Small Business Development of the Eighty-second Legislature hereby submits its interim report including recommendations for consideration by the Eighty-third Legislature.

Respectfully submitted,

John E. Davis

Hubert Vo

Rodney Anderson

Borris L. Miles

Jim Murphy

Ron Reynolds

Kenneth Sheets

Hubert Vo  
Vice-Chairman

Members: Rodney Anderson, Borris L. Miles, Jim Murphy, Ron Reynolds, Kenneth Sheets

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## INTRODUCTION

At the beginning of the 82nd Legislature, the Honorable Joe Straus, Speaker of the Texas House of Representatives, appointed seven members to the House Committee on Economic and Small Business Development. The Committee membership included the following: John E. Davis, Chairman; Hubert Vo, Vice Chair; Rodney Anderson, Borris L. Miles, Jim Murphy, Ron Reynolds and Kenneth Sheets.

The committee was given jurisdiction over all matters pertaining to:

- Workforce training;
- Commerce, trade and manufacturing;
- Economic and industrial development;
- Development and support of small businesses;
- Job creation and job-training programs;
- Hours, wages, collective bargaining, and the relationship between employers and employees;
- Unemployment compensation, including coverage, benefits, taxes, and eligibility;
- Labor unions and their organization, control, management, and administration;
- Weights and measures; and
- The following state agencies: the Texas Economic Development and Tourism Office, the Texas Workforce Commission, and the Texas Workforce Investment Council.



## HOUSE COMMITTEE ON ECONOMIC AND SMALL BUSINESS DEVELOPMENT

### INTERIM STUDY CHARGES AND SUBCOMMITTEE ASSIGNMENTS

- Examine previous Emerging Technology Fund (ETF) grants awarded for cancer-related research. Determine whether future awards for similar projects are appropriate for the ETF program or whether they should be considered by the Cancer Prevention and Research Institute of Texas.
- Examine the impact of research at state universities on the state economy. Identify ways to increase the partnership opportunities between private business and research institutions to enhance the commercialization of newly discovered technology. *(Joint with the House Committee on Higher Education)*
- Examine the state's efforts to encourage new business growth and retain existing businesses in order to strengthen our state's economy. Determine whether a consolidated approach to statewide economic development would be more effective.
- Examine the economic impact of the automobile industry in Texas and the state's ability to compete with other states for future automotive manufacturing facilities. Identify policies, regulations, and current statutes that either hinder or facilitate job growth and investment by the automotive industry. Review opportunities available to partner manufacturers' research and development with Texas colleges and universities, including technology enhancements in safety or alternative fuel systems.
- Examine Texas' cluster initiatives in an effort to remain competitive in today's economic development arena. Review the implementation of recommendations made by the Governor's Competitiveness Council and consider new recommendations for Texas to remain an economic development leader.
- Examine current economic development programs available in urban areas in Texas and other states. Report on successful programs and make legislative recommendations for innovative economic development programs. *(Joint with the House Committee on Urban Affairs)*
- Monitor the agencies and programs under the committee's jurisdiction and the implementation of relevant legislation passed by the 82nd Legislature, with specific attention to the implementation of HB 2457 (82R), regarding the oversight of the Emerging Technology Fund.

In addition, Speaker Straus requested that each substantive committee: (1) study and make recommendations for significantly improving the state's manufacturing capability; and (2) find ways to increase transparency, accountability and efficiency in state government.

All charges were studied by the committee as a whole.

## **Economic Development in Texas**

*"People go where economic opportunity is, in turn, bringing more opportunity with them."<sup>1</sup>*

*"Clearly there is less angst involved in conducting business in Texas."<sup>2</sup>*

*"If you rent the smallest U-Haul truck to move from L.A. to Big D, it will run almost \$1,100. Going the other way, the cost is about \$750. That says something about which way the trucks are running."<sup>3</sup>*

*"There isn't another state that has as vibrant a business environment as Texas does. It's not close."<sup>4</sup>*

### **Gone to Texas**

During the early days of the Republic, Texas was land-rich and cash-poor.

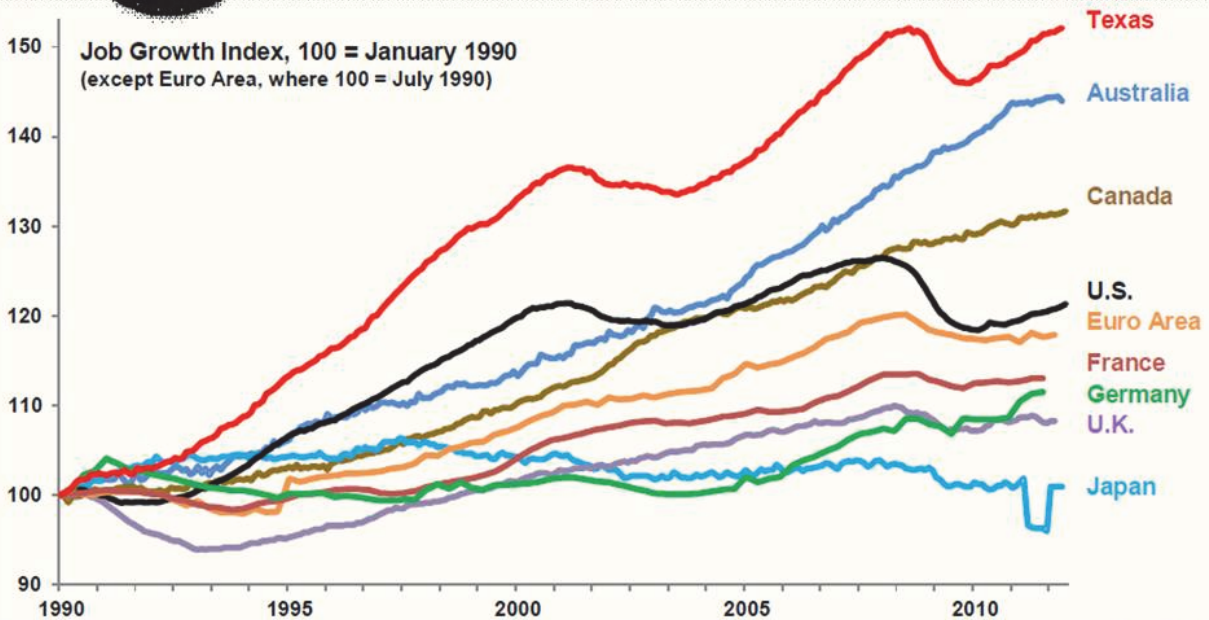
In 1841, the Republic embarked on a series of four colonization contracts in an attempt to attract settlers, ease its wartime debt, and create a fledgling economy. Heads of families were given 640 acres, and were required to build a house and cultivate at least fifteen acres.<sup>5</sup> The land offer was one of Texas' first economic development tools.

Free land attracted a motley group of inhabitants, described by an early biographer as "comprised of a class who had been unfortunate in life; as it could hardly be supposed that the fortunate, except in a few instances, would voluntarily make choice of a country wherein they were to encounter such a number of difficulties as the first settlers had to contend with; who in a great measure were banished from the pleasures of life, and almost from its necessities."<sup>6</sup>

Currently, Texas is the 15th largest economy in the world. The state is home to 64 Fortune 500 companies, more than any other state. Texas has America's largest volume port, and has been the number one exporter in the United States for a decade. It boasts the largest medical center in the world. The state makes stuff like pickup trucks, airplanes, computers and cowboy boots. It is America's fastest growing state, and home to three of the ten largest cities in the nation. The motley crew of early settlers has turned into a diversified group of independent thinkers and workers.

Texas' attention to the economy is widely considered one of the reasons the state has weathered the recession relatively well. Our good fortune; represented by factors such as high oil prices and cheap land, and our good business climate; represented by low taxes and trailblazing business incentives, have brought the state out of the recession before all others.

## Job Growth Around the Globe



SOURCE: Federal Reserve Bank of Dallas.

In fact, Texas is now considered to be in expansion mode, meaning that the available jobs currently number more than the jobs available prior to the recession.<sup>7</sup> Texas metros continue to dominate the rankings of best performing cities, taking four of the top 5 positions and nine of the top 25 in the Milken Institute's survey. According to the Institute, Texas employers were responsible for one of every five jobs created in the nation from June 2010 to June 2011.<sup>8</sup>

Obviously, we're doing something right. However...

### It's All Relative(ly) Economic

*"It takes all the running you can do, to keep in the same place. If you want to get somewhere else, you must run at least twice as fast as that!"<sup>9</sup>*

The thing to remember about being on top is that it takes a lot of work to stay there. And the thing to remember about economics is that everything is relatively economic.

Many of Texas' businesses, such as chip manufacturers and power generators, rely on large amounts of water for their businesses. In addition, the more than one thousand people who continue to arrive in Texas every day will want a drink of water at some point. Water is a basic

fundamental need. It doesn't matter how great our business incentives are if water is not readily available. Texas needs to find the funding for a water plan.

We need more power for our electric grid. Texans came very close to overloading their grid during the grueling days of the summer of 2011. A recent assessment by the North American Electric Reliability Corporation ranks our state dead last in the reliability of our electrical system. This would not be a "pro" on a business checklist of "Reasons to Relocate to Texas."

Our roads and bridges are deteriorating. We're not ready for the Panama Canal expansion, and the additional ships that will arrive in our ports. If businesses can't get their goods to market in a timely manner, it won't matter that we are one of the few states that doesn't have a personal income tax.

Our manufacturers are in dire need of workers with skills. If we can't get our students career-ready, businesses won't come to a state where there are no qualified workers.

Venture capital, which was never plentiful in Texas to begin with, continues to shrink, as other countries provide opportunities to individuals with money to invest.

Attention must be paid, continually paid. We must address the weaknesses of this state, and bolster the strengths.

It all matters. Because it's all economic.

**The Emerging Technology Fund (ETF) and Cancer  
Prevention and Research Institute of Texas (CPRIT)**

## **Biotech Frontiers in Texas: CPRIT and the ETF**

*"The people of Texas wanted us to prevent cancer and save lives but also to promote revenue generation in the state."*<sup>10</sup>

*"We're growing organs in test tubes."*<sup>11</sup>

*"Oh brave new world, that has such people in it!"*<sup>12</sup>

There are some amazing things happening in Texas.

Created by the voters in 2007, the Cancer Prevention and Research Institution of Texas (CPRIT) invests in commercialization of research to create small businesses in which they are allowed to take an equity stake. CPRIT quietly goes about its business towards their stated goal of cancer research with the hope of one day eradicating the disease.

Created by the legislature in 2005, the Emerging Technology Fund (ETF) invests in commercialization of research to create small businesses in which they are allowed to take an equity stake. The ETF has had a rockier road in the public perception arena, as it goes about its goal of creating new technologies, and thus, new jobs for Texas.

Both programs invest in the new world of biotechnology. This committee was charged with examining whether or not the ETF was investing in awards that would more appropriately be handled by CPRIT, and if changes should be made.

But whether or not the programs overlap, it's important to know why the government should be investing in these ventures at all.

### **What's the Big Deal About R&D?**

*"We can either compete or fail... We can either diversify the high tech economy of Texas, or watch those companies and those jobs go somewhere else. That's just the reality of it. Companies compete with companies, states compete with states, Texas is competing against the world. This is a global economy."*<sup>13</sup>

We need jobs. Lots and lots of jobs. In addition to the Texans already here, up to 1500 more arrive every day. Many of the jobs in our lifetime have gone away, and won't be coming back. When was the last time you used a typewriter, or referred to the encyclopedia set on your bookshelf? The jobs that created the typewriters and fact-checked the encyclopedia set have vanished.

The tech boom filled the void of declining jobs nicely for a time, but today's technology job could go by the way of the rotary phone tomorrow. We need to be constantly preparing for the next job market. And it would be best if our country, and particularly our state, created those jobs.

Research and development refers to deliberate efforts taken to increase a company's knowledge base and to find applications for new ideas that translate into new products. These new products create small firms. These small firms, along with their big ideas, grow into large firms that hire lots of people. They are the main economic drivers of our state and nation. Our economy is heavily dependent on fresh ideas and products.

Prior to 1979, the federal government provided the bulk of funding for R&D, which was, according to Newsweek magazine, "astonishingly productive," leading to the development of lasers, global positioning satellites, magnetic resonance imaging, DNA sequencing, and hundreds of other technologies.<sup>14</sup>

However, the federal government has gotten out of the research and development business, and the majority of such funding is now provided by private businesses and corporations. When a downturn in the economy occurs, those businesses tend to cut that funding. This makes recession recovery a lengthier process, because new jobs come about with the advent of the "next big thing." Without prior research and development, "the next big thing" fails to occur.

The United States conspicuously lacks a national innovation strategy and an institution to advance one. In February 2009, the Information Technology and Innovation Foundation's (ITIF) Atlantic Century report ranked the United States sixth out of forty leading industrialized nations in innovation competitiveness.<sup>15</sup> While that may not sound too awful, the same study measured how much countries were doing to make themselves more innovative for the future, calculating metrics such as human capital, IT infrastructure, economic policy and entrepreneurship. The United States was ranked last. Among forty nations, fortieth place.

We're slipping.

### **Texas R&D**

With the federal government out of the research and development game, and businesses trying to cut back, the burden falls to the states. Thirty-eight states offer research and development tax credits. Texas is not one of them.

In 1999, the Texas Legislature attempted to encourage private research and development by enacting a tax credit for eligible businesses. The credit was based on the taxpayer's increase in research spending, compared to an established spending pattern. There were two ways to receive the credit; either by direct investment, or a portion of investment in expenditures made with a qualified research entity. That credit was repealed in 2006 during reform of the franchise tax.

ETF and CPRIT were designed to pick up the slack in a big way.

### **Investing in the Future**

*"The kind of money and the style of money and the timing of the money from ETF and CPRIT is absolutely critical. It has set us apart in Texas...we're in a whole 'nother league."<sup>16</sup>*

The Emerging Technology Fund invests in research in a number of ways. For purposes of this report, the focus is on Subchapter D, incentives for commercialization. Which is better known as investments in new technologies pursued by small, start-up companies. Thus far, the ETF has invested in nineteen companies that are directed at cancer research, prevention or treatment. These companies include a cancer treatment that introduces synthetic micro RNA back into tumors to trigger their deaths, and a therapeutic cancer vaccine designed to generate a tougher and more potent immune response against cancer cells.<sup>17</sup>

CPRIT also invests in research in a variety of ways, including thirteen (thus far) start-up companies. The most recent investments include an Austin based diagnostics maker, a Texas A&M University spin-out in College Station, and a Houston based company whose lead product is an inhaled therapeutic that stimulates the innate immune system.<sup>18</sup>

### **Starting Small, Thinking Big**

If you had to guess where the next big innovation would emerge, you would probably think that large, established firms would have the edge. And it would have been a good guess, because that's what a lot of economists once thought, too.

However, in numerous industries, such as medical devices, communication technologies, semiconductors, and biotechnology, innovation is emerging from the small, start-up firms. Even in areas where large firms traditionally dominate, such as energy research, start-up firms appear to be playing an increasing role.<sup>19</sup> These relatively young firms' growth is largely financed by venture capitalists and public equity markets. But what happens when venture capital isn't present?

### **Venture Capital Funding**

Venture capitalists are typically people who have had successful careers as scientists, engineers, doctors or entrepreneurs. Working through firms, they raise money from pension funds, endowments, foundations and high-net-worth individuals to form a venture fund. The fund is then invested in the most promising start-up companies, typically over a ten year period. This is the difference between investors and venture capitalists: venture capitalists are in the game for the long haul. They know that growing new, promising companies doesn't happen quickly.

Venture capitalist are a huge factor in job creation and economic growth. They typically choose companies developing significant innovations, groundbreaking technology. These are the types of companies that will grow our economy. Examples of companies that were originally backed by venture capital are FedEx, Google, Facebook, Staples, Starbucks, and Genentech.

The venture capitalists also work with the fledgling company by participating actively in company operations, and guiding them through multiple rounds of financing. They assist with hiring key management, and take seats on the boards of directors. They have a close connection, and the interest and skills to help the company succeed. They help the companies achieve specific milestones to receive fresh funding for continued growth.



If the company fails to meet goals, the venture capitalist may decide to protect its investors by ceasing funding. If the company succeeds, growing to a point where it can be acquired by another company, or go public, the venture capitalists are bought out, and the profits invested in other start-up companies.<sup>20</sup>

It actually sounds exactly like the type of company formation process undertaken by CPRIT and the ETF, so why not let the venture capitalists take over from here?

Because, unfortunately, the venture capital in Texas is not abundant.

### **Why Not Texas?**

According to the 2011 Global Insight study, from 1970 until 2010, venture capitalists invested \$27.7 billion in 1,743 companies in Texas. That sounds really impressive, until you note that according to the same study, and the same time period, venture capitalists invested \$215.7 billion in 9,827 companies in California. And although we are getting better, the state is still not where it needs to be.

Much of this is because California, through its university system, has been investing in research for a lot longer than Texas. Commercialization of university research is still in its infancy in Texas. And although Texas has several initiatives to assist small businesses, those initiatives are fragmented.

A lot of this could also have its roots in attitude. Texas is a fiscally conservative state, and its citizens are, for the most part, not risk-takers. The recession has cemented that conservatism, because we've seen firsthand what crazy risks can do to the economy. Legislators, too, are loathe to invest state dollars in risky enterprises. Misunderstandings about the nature of the Emerging Technology Fund results in legislation to make the fund more transparent, more certain, in an attempt to satisfy those who would rather get rid of the fund altogether. But those fixes can go against the very nature of the fund. And constantly trying to satisfy those interests can make Texas appear to be a state that is unsure about its encouragement of entrepreneurs. It's hard to take risks, and no one wants mistakes. Venture capital is not a sure thing. It is not for the faint of heart. But it is only by embracing risk that we create innovative technologies and applications. It is what our country is known for.

Although Texas has never been a huge draw for venture capital funding, another factor will most likely diminish its ability even further. The United States is no longer the only place that attracts such funding. Although other countries have always attracted a sliver of the available funding, that sliver is growing into a pie-sized wedge. The share of funding heading to Asia -- especially China and India -- and other markets from Toronto to Tel Aviv is growing rapidly.<sup>21</sup>

But the state must compete, or be left behind. And if venture capitalists aren't interested, it falls to the citizens of Texas to make sure that big ideas are nurtured, and that the state reaps the rewards of that nurturing in the form of tax revenues and jobs. CPRIT and the ETF exist for a reason.

## **A Question of Overlap**

The fact that both CPRIT and ETF have both invested in cancer research may seem like an overlap, however, during testimony before the committee, it was learned that CPRIT and the ETF generally invest in different phases of research. The ETF invests in early-stage, preclinical, phase one investments, and CPRIT invests in research that is further developed.

An early-stage investment means that the product has not yet reached its expensive phase, which is generally animal or human testing. In the ETF plan, the state invests early, and the company is then required to find additional funding on its own. Private investment dollars generally provide funding for the more expensive phases of research, with the ETF equity share growing along with the additional funding. In 2011 alone, the companies attracted \$185 million in follow-on investment.

CPRIT just recently acquired the ability to take an equity stake in the emerging companies in which it invests. Thus far, the \$60.8 million invested in these companies has attracted over \$200 million in outside, follow-on capital.

Think of follow-on capital as a great interest rate. When you invest in a certificate of deposit, you look for the best interest rate you can find. When investing in a company, you look for one you think might be successful. If others follow Texas' relatively small investment with money of their own, that means others think the company could be successful, too. And with every dollar of follow-on capital, our investment becomes more valuable.

## **How the Awards are Made**

CPRIT relies on well-known and accomplished scientists and practitioners in the field of cancer prevention to conduct reviews of those companies who are seeking funding. The committee members live and work outside the state of Texas. Once the applications have been scored by the individual members, they meet in person or by teleconference to discuss those with top scores. The finalists are then reviewed by both a commercialization review panel and a committee made up of scientific reviewers.

The commercialization review panel is comprised of experts in a bioscience field and commercializing technology. The assessment of the proposal includes the commercial potential; which takes into account the applicant's management, financial structure, and intellectual property. Applications that score highly are forwarded on to be evaluated for scientific merit.

If both the scientific review and commercialization review committees give positive ratings, a more extensive review is undertaken. This includes additional underlying intellectual property assessment and a full due diligence of the company's potential to commercially develop the proposed drug, diagnostic or device. Those results are once again examined by the commercialization review council, which forwards the final list to the executive director.<sup>22</sup>

## **ETF**

ETF awards "bubble up from the bottom." Eight regional centers of innovation and commercialization have been set up around the state to handle budding entrepreneurs and their ideas.

Over one thousand volunteers in these regions with experience in science, business, investment and entrepreneurship do the heavy lifting for the state, working with applicants to assist with proposal development and commercialization activities. Thus far, approximately two thousand businesses ideas have been vetted by these centers, and promising ones are forwarded to the Statewide Advisory Committee on a quarterly basis.

Once the statewide advisory committee receives the application, they take an in-depth look at the technology, the available market, and the capability of the management team. The process includes background checks, examination of tax information, patent filings and ownership of intellectual property. Applicants surviving the regional center and advisory committee face the governor, lieutenant governor and speaker of the House. Final approval requires unanimous consent from these three.

## **A Clash in Mindset**

At this writing, CPRIT had made headlines when a Nobel scientist left, citing concerns with a recent commercialization award shared by Rice University and M.D. Anderson. The award has been retracted, and is undergoing another review.

There appears to be nothing shady going on at CPRIT. At the core of the dispute is a difference in philosophy. There are scientists who spend their lives on pure research, creating value with their discoveries. But now, in a move that is also playing out in universities, the state is seeking further value by commercializing that research. When research is brought out of the lab and into the hands of consumers, further value is created; not only in quality of life, but in job creation and profits. We need to fund both research and commercialization. They are no longer exclusive of one another.

## **Why Biotech?**

*Biotechnology: the use of living organisms or other biological systems in the manufacture of drugs or other products or for environmental management, as in waste recycling: includes the use of bioreactors in manufacturing, microorganisms to degrade oil slicks or organic waste, genetically engineered bacteria to produce human hormones, and monoclonal antibodies to identify antigens.*<sup>23</sup>

Wow. Sometimes the best way to understand is not by definition, but by example.

Some of the breakthroughs in biotech that are going on out there:

The bacteria that live on your teeth erode enamel and cause tooth decay. A Florida-based company has engineered a new strain that will live on your teeth, releasing an antibiotic that will kill the strain that causes decay. Dentists will need only to swab the new bacteria on your teeth once to keep them healthy for a lifetime.

Electronic pacemakers save lives, but the hardware wears out. Researchers at several universities are working with a biological alternative: pacemaker genes expressed in stem cells that are injected into damaged regions of the heart.<sup>24</sup>

Nearly 65 million people are at risk from arsenic-related health problems due to millions of contaminated wells, especially in developing nations. Rice University has developed rust nanoparticles to lift the contamination away. Rust nanoparticles, which have magnetic properties, bind to arsenic; the rust and arsenic can then be lifted out of the water by a handheld magnet. This leaves behind drinking water pure enough to meet Environmental Protection Agency standards. The simplicity of the method, which requires no electricity or extensive hardware, will have a global impact.<sup>25</sup>

Biotech transforms both economies and lives.

### **Economics of Biotechnology**

Historically, the combination of groundbreaking discoveries and subsequent commercialization has preceded periods of prolonged economic expansion. The steam engine and related new technologies launched the Industrial Revolution in Great Britain. The internal combustion engine and electric power did the same for America. The microchip laid the foundation for the Information Age.<sup>26</sup>

Once new discoveries are made, however, there is usually a lag between the discovery and the use of the new technology into products. Biotechnology is new, and developing rapidly, however, it will take time to conceive products and thus, affect the economy in a noticeable way. And biotechnology could take longer for the average person to see results; innovations that deal with the biology of a human being are subject to more thorough review and testing than the latest innovations in home computers.

However, the life science industry is coming along, more than doubling revenue from \$8 billion in 1993 to \$20.2 billion in 1999. Expansion should continue; ten years ago, 41 states were already taking note and pursuing economic initiatives to foster biotechnology. That's a huge show of support that this industry has great economic potential.

### **Texas Can Be a Player**

Although Texas does not attract major venture capital in the biosciences like California and Massachusetts, we are in the top five.

Texas has a dynamic biotechnology marketplace with an estimated economic impact of \$75 billion. The state has many national top 10 rankings in biotechnology and is home to over 4,100

biotechnology, biomedical research, business and government consortia, medical manufacturing companies, and world-class universities and research facilities, employing over 104,400 at an average annual salary of over \$67,300. A significant number of top global biotechnology and pharmaceutical companies have Texas locations.<sup>27</sup>

### **Put Me In, Coach: A Game-Changing Move**

Apparently Texas' efforts are starting to catch the attention of others. Our state has hit a home run with the recent announcement of the location of an advanced biodefense center at Texas A&M University. The center is one of three Centers for Innovation in Advanced Development and Manufacturing. The other two were awarded to Maryland and North Carolina.

The center's purpose is to develop and manufacture drugs to fight bioterrorist threats, pandemic influenza and other infectious diseases. One of the biggest federal grants to the state of Texas since NASA, the award will lead to Texas becoming a leader in biopharmaceuticals.<sup>28</sup> The Center is expected to create approximately 1000 jobs, although its influence will definitely lead to spillover benefits for a wide range of Texas businesses.

### **Base Hits: Texas Biotech Companies that Could Change the World**

It's important to note other interesting work going on in Texas. Although not on the scale of a biodefense center, many startup companies in Texas are using new technologies to attempt to solve previously unsolvable problems.

Pulmotect -- develops products that boost the innate immune system to raise the body's natural defenses against a wide range of lung infections, from influenza to bioterror agents such as anthrax and plague.

Smartfield -- developed technology that uses sensors to monitor rainfall, crop canopy temperatures and stress levels, informing growers of the real-time irrigation demands of virtually any type of row crop. This makes it easier for growers to determine the ideal conditions for watering crops, ultimately reducing pumping and labor costs, saving water and improving crop yields.

MicroZAP -- uses directional microwaves at varying strengths to target disease-causing organisms in food and has demonstrated success in killing deadly antibiotic-resistant bacteria.

Sunrise Ridge Algae -- uses algae to convert wastewater and carbon dioxide into renewable energy and animal feeds, and will serve as an alternative to food-based biofuels, such as ethanol.

1st Detect --miniature chemical detector provides rapid chemical analysis and is capable of detecting residues and vapors from a wide range of chemicals including explosives and chemical warfare agents.<sup>29</sup>

All of these companies got their start with Emerging Technology funds.

Researchers are looking at specially treated nanites that attack the specific location of a cancer, eliminating the need for chemotherapy; a cure for macular degeneration, one of the leading causes of blindness; a specialized pacemaker that detects an oncoming heart attack and alerts a physician before the patient is even aware anything is wrong. All Texas innovations in the works, with the help of the ETF.

## **Recommendations**

The problem with regulation of entrepreneurial ideas is that it boxes up "out of the box" thinking. Over-regulation of any aspect of our economy, even with good intentions, has usually led to bad results. So, while it may appear to be the reasonable thing for this committee to urge the ETF not to invest in companies that deal with cancer in any way, it wouldn't necessarily be the right thing. However, this committee would like to see the discussion process between ETF and CPRIT formalized in some way; perhaps through a list of guidelines for "talking it out" between the two entities when an ETF project is related to cancer prevention.

Both entities must continue to exist. And both should continue their efforts to educate Texans (and legislators!) of their role in the economic development of this state. Both entities should stress that the funds are not a magic bullet with instant results, but thoughtful, methodical doses of incentives that will pay off several years in the future.

Re-enactment of an R&D tax credit continues to be mentioned as one of the major puzzle pieces that would encourage private companies to spend some of their own money on this endeavor. Although CPRIT and the ETF are impacting research in a major way for the state, expanding the pool would enable a lot more fish to swim.

## Commercialization of University Research

## **From the Lab to the Marketplace: Commercialization of University Research**

*"There are consequences for failing to meet potential. The consequences include fewer jobs, less contributions to the tax base and fewer advances in human welfare. So the consequences for failing to maximize are significant. And we believe that more can be done."<sup>30</sup>*

*"The mere presence of key research activities has served to attract companies interested in taking full advantage of the results of the research or the talent this activity attracts. The payoff is often long term, but states that do not make the investments do not reap the benefits. Public-private research collaborations have been at the core of success for many regions, as illustrated by the relative economic success of most communities with research institutions."<sup>31</sup>*

A key part of a state's innovation efforts is its universities and the research done by them, although the idea that universities should own and sell their discoveries was not part of the academic culture until recently. A big factor was the passage of the Bayh-Dole Act of 1980. The change in the law that this act brought about was profound. In the past, intellectual property rights resulting from federally sponsored research at universities belonged to the federal government; but now the universities could own them. The universities would be able to patent discoveries and license the patented material to businesses interested in developing marketable products. Universities could even sponsor start-up companies based on the intellectual property that they owned and hold an equity stake in them.<sup>32</sup>

Ownership of research spurred universities to pay more attention to their intellectual property. Between 1991 and 2004, the number of patent applications filed by universities in the United States increased from 13.7 applications per institution to 57.8; licensing income increased from \$1.96 million per university to \$7.06 million; and new university-based startups increased from 212 in 1994 to 462 in 2004.<sup>33</sup> Texas is starting to move up in this regard; in 2007 the state ranked 32nd in number of independent inventor patents per 1,000 people, by 2010, we were 26th. This figure is important because it is a measure of the amount of research occurring (or not occurring) in the states.

Why is university research important?

### **Leading the Way Towards Meaningful Jobs**

*"There are those who still believe in research for research's sake, which is critical, but when technology can lead to a lifesaving drug or a lifesaving guardrail...those kinds of technologies not only deserve to be commercialized, but should be commercialized to return the investment back to the taxpayers."<sup>34</sup>*

Many industries don't do basic research anymore, depending instead on universities to pick up the slack. Studies have shown that a substantial proportion of industrial innovations in high-technology industries like drugs, instruments, and information processing have been based directly on recent academic research, even though many times the invention itself did not stem from the universities.<sup>35</sup> Basic research leads to commercially viable technologies, which leads to meaningful jobs.



And meaningful jobs are what Texas, and the rest of the United States, needs. To create jobs, any jobs, is a great short-term strategy when the country is in a recession. But it shouldn't be a long-term goal. The Bureau of Labor Statistics has found that U.S. wages appear to be falling, a phenomenon that began before the recession. Obviously, this has a lot to do with manufacturing and research and development activities being shuttled to other countries. But it also has to do with what we are replacing those jobs with; in many cases, lower-paying jobs with little hope for improvement.

Innovation is critical to ensuring better wages and better jobs. Up to 90 percent of per-capita income growth stems directly from innovation, a product of research.<sup>36</sup> In 1996, the buckyball was developed by two chemists, some graduate students and a few small grants from the National Science Foundation. That development has led to initiatives in nanotechnology, expected to be a \$3 trillion market by 2020.<sup>37</sup>

It has been estimated that 80 percent of leading new industries may originate from university-based research. Although research universities comprise fewer than 200 of over 4,000 postsecondary institutions, they are now recognized as essential to United States economic leadership.<sup>38</sup>

The benefits to commercializing university research are broad. Inventors can solve problems while generating monies for continued research. Students can obtain research skills for career pathways, the startups enable the universities to contribute to regional economic development, and the regions themselves get new businesses and jobs.<sup>39</sup>

We send our children to universities in hopes that it will lead to better jobs for them. But the research that universities are doing can eventually lead to better jobs for all of us.

### **Tier One**

Although not an official term, a "tier one" university is generally considered a school that expends over \$100 million annually in research grants and has selective admission guidelines. And money attracts money; tier one universities usually get the largest research grants and endowments. To attract research money to Texas, the state needs as many tier one universities as it can get.

The passage of HB 51 in 2009 was an attempt to increase the number of tier one, or research universities in Texas. Prior to passage of the legislation, Texas was home to three universities of tier one status: Rice University, Texas A&M, and The University of Texas at Austin. Even though that may seem sufficient, once our state's population and economy are factored in, Texas students had fewer local options than other comparable states, such as California and New York. In fact, with more than 24 million residents and only two public tier-one institutions, the state's top institutions are unable to admit all applicants. More than 10,000 high school graduates in Texas are lost each year to doctoral-granting universities in other states.<sup>40</sup> Although many of those graduates probably planned to leave the state anyway, more tier one options could keep them closer to home. Which would, in turn, keep their advanced job skills in this state.

Besides the one private and two public research universities, Texas is home to several emerging research universities; Texas Tech University, The University of Texas at Arlington, The University of Texas at Dallas, The University of Texas at El Paso, The University of Texas at San Antonio, the University of Houston, and The University of North Texas. Texas State University in San Marcos has recently joined this list. Emerging research universities award at least 20 doctor-research/scholarship degrees per year, and offer at least ten doctor-research/scholarship programs. It is expected that these universities have the best chance of achieving research university status in the coming decade.

The legislation established three funding streams to assist in this endeavor. The first, the National Research University Fund, incentivizes the enhancement of emerging research universities by rewarding those universities that meet critical benchmarks toward achieving national prominence as major research universities. In order to receive monies from this fund, certain steps must be reached toward designation as tier one research institutions, including spending at least \$45 million in restricted research in two consecutive years; having a total endowment of at least \$400 million; and awarding 200 doctoral degrees per year.

The second fund is the Research University Development Fund; to provide funding to eligible research and emerging research universities for recruitment and retention of faculty. And the third, the Texas Research Incentive Program; was established to provide matching funds to assist eligible institutions in leveraging private gifts for the enhancement of research productivity and faculty recruitment. Although set up legislatively, these funds contain no appropriated monies.

At this time, no emerging research universities have accessed the National Research University Benchmark Fund, but two are making significant strides towards that goal. It has been estimated that this initiative would help the state add two or three more tier one universities within ten years.

## **A Scorecard**

The Milken Institute issues a State Technology and Science Index every two years that enables states to assess their science and technology capabilities, along with their ecosystems for converting them into companies and high-paying jobs. Texas' overall rank is 19, up from 20th place two years ago.<sup>41</sup>

Broken down, Texas in 2010 ranked 38th in human capital, up from 44th place in 2008. There are 21 human capital indicators; including average math SAT scores, percentage of households with computers, state appropriations for higher education, and recent bachelor's degrees in science and engineering per 1,000 civilian workers.

The research and development inputs measure our state's ability to attract various types of federal, industry, and academic funding. We ranked 28th on this input, up from 29th place in 2008. Risk Capital and Entrepreneurial Infrastructure measures the stock of capable entrepreneurs and risk capital available to support the conversion of research into commercially viable technology products and services. Texas ranked 12th in both 2010 and 2008. The

Technology and Science Work Force Composite includes data such as the intensity of medical scientists, microbiologists, computer systems analysts and physicists per 100,000 civilian workers. In 2010, Texas ranked 10th, down from 8th place in 2008. The final indicator is Technology Concentration and Dynamism, a measure of the growth of high tech industries. Texas ranked 9th in 2010, a huge improvement over its 15th place showing in 2008.

With an overall rank of 19, Texas is not considered in the top tier of this index. Yet.

## **Texas Research**

Texas universities do a lot of great research. What Texas hasn't done well in the past is commercialize that research. One arm of the Emerging Technology Fund strives to bring world-class researchers with commercialization experience to the state to encourage universities to consider the economic development side of research. In the past, researchers were rewarded for their publishing efforts, and not for working with industry. That is changing in Texas. For instance, Texas A&M University System has voted to allow commercialization of faculty research to be a consideration in the granting of tenure.

The results of changing focus can be impressive. A single investment by the ETF of \$2.5 million brought a leading nanotechnology researcher to the University of Texas. That researcher brought 80 additional staff. That group has created (thus far) 32 disclosures (by federal law, new discoveries must be disclosed), four licenses (licenses are cheaper than patents, and can be sold to another company for further study), 12 patents and the formation of three new companies.

The ETF has also provided matching grants to be used to pull down dollars from the federal level. Consortia are created when industry comes together with institutions of higher education to solve a problem through research. Federal money is usually attached to such a project, and state matching grants help ensure that some of the proposed consortia come to Texas.

According to 2010 data, the state has garnered over \$44 million in grants from federal and out of state grants, and formed direct collaboration agreements with fourteen Texas institutions of higher education, twelve federal agencies, and thirteen private industry partners.<sup>42</sup> Examples of these consortia include: nanotechnology research at Texas Tech, water desalination research at the University of Texas-El Paso, and trauma care research at the University of Houston.

## **Incubators and Commercialization**

When discoveries are made by faculty or students within universities, it is of potential value if that discovery meets a market need or creates a new market. But the value is only achieved if the invention is disclosed, protected by patenting and linked to a sound business strategy to transform that discovery in to a real product or service.<sup>43</sup>

In 2001, the Texas Legislature passed legislation authorizing Texas higher education institutions to establish Centers for Technology Development and Transfer to enhance the economic growth

of new technology and related industries and encourage greater public/private partnerships.<sup>44</sup> Interested parties will tell you this mechanism has had mixed results. A successful office relies on an individual with lots of business connections, and the ability to take research, see its potential, and locate a business partner with similar interests. The person in charge of the commercialization office also has political and social minefields to navigate. There can only be so many "winners" chosen, and well-respected faculty sometimes have to hear the difficult news that their project isn't considered marketable.

Politics aside, however, there have been some remarkable developments. One of the University of Houston's prime royalty producers is an epilepsy drug. First invented 25 years ago, it has recently received FDA approval. Surgeons from UT Southwestern Medical Center Dallas and engineers from the University of Texas at Arlington have developed surgical instruments that can be supported inside the abdominal cavity with magnets, thus eliminating the need to puncture the abdominal wall in multiple locations. Texas A&M has developed a cold pasteurization system to remove parasites and pathogens from imports in the U.S. for increased consumer safety. The net income for technology transfer activities at state universities for 2009-2010 was approximately \$33 million.<sup>45</sup>

Some critics complain that universities still do not do enough active technology transfer, either sitting on patents they own or demanding unrealistic value for proprietary rights to university inventions. It is easier for a university to license their discovery to another company for a cash infusion rather than spend extra time to bring the product to market and create companies, and thus, jobs. One proposed solution would allow faculty members to bypass campus technology transfer offices and negotiate their own licensing agreements, through "proof-of-concept" centers.<sup>46</sup>

The first proof-of-concept center was established in 2001 at the University of California, in San Diego. The William J. von Liebig Center has thus far helped to start 26 companies that have created more than 180 jobs and attracted more than \$87 million in financing. Other universities that are working on the proof-of-concept model include the Massachusetts Institute of Technology, Georgia Tech, and the University of Kansas.<sup>47</sup>

## **Growing Our Own**

*"Products, companies and even industries have life cycles. Today's entrepreneurial success stories are tomorrow's legacy industries. Investment in research and development--especially applied research that engages companies of all sizes--is critical for seeding tomorrow's future opportunities."*<sup>48</sup>

Getting our smartest university researchers to consider practical applications, rather than "research for the sake of research" has necessitated a change in environment.

The University of Texas at Austin has created a not-for-profit incubator to assist with early-stage guidance to create successful businesses. Texas Venture Labs was a formalization of their existing innovation strategies, and in the two years since their launch in 2010 has worked with 40 companies and raised more than \$25 million in investment capital. The University began by

recruiting thirty graduate students from its business, law and engineering schools to work in five-person teams alongside entrepreneurs and investors throughout the new venture creation process. A recent \$6 million gift will fund expansion of the venture.

Texas State University is completing the first building at its 38-acre Science, Technology and Advanced Research Park, which is expected to attract companies created by research done in Texas college labs. As a complement to the building, Texas State will be offering a new doctorate program that combines science and business courses, giving students the knowledge needed to bring their own discoveries to the marketplace.<sup>49</sup>

Texas A&M is revamping their research park and is in the beginning stages of planning a business incubation center for student startup businesses. The new business incubator will occupy space in the current research park and serve as a resource where students, faculty-researchers, and other stakeholders can evaluate marketplace challenges and opportunities to develop new solutions that can lead to student business startups.<sup>50</sup>

If those discoveries and companies that have their genesis are developed and built out of state, potential jobs and benefits leave as well. Thus, creating companies and patenting discoveries are one-half of the goal. The continued goal is to create research infrastructure that will encourage clusters to develop. When universities create a good business-friendly research infrastructure, it helps to lure companies to Texas. Primarily, being "business-friendly" means to have a long-term commitment to collaborative and predictable relationships with commercial companies. Universities and their commercialization efforts should strive toward providing key infrastructure and services that businesses can get nowhere else.

### **Luring Others**

*"We educate the best and brightest from around the world at our universities, and when their student visas expire, we show them the door."<sup>51</sup>*

A large percentage of our successful tech start-ups are pioneered by immigrants. They are trained in our universities, and then they are sent home. Their successful enterprises are started elsewhere. America jump-started its economy after World War II by racing against Russia to recruit the very best scientists from other countries. Those same kinds of efforts can surge our economy again. It has been estimated that every foreign-born graduate with an advanced degree from a U.S. university who stays here to work in a science, technology, engineering or mathematics field creates four more jobs for Americans.

We also need to encourage entrepreneurs from other countries. After a long period of discouraging immigration, Singapore realized they were stagnating. Skilled immigrants have been given employment passes, allowing the immigrants to work and ultimately apply for permanent residency. The country's EntrePass program allows a foreign national with \$50,000 in investor funds--as well as a business plan approved by the government--to stay in the country for one year, with renewals available afterwards. Australia, Germany and Canada are all rethinking their closed stance on immigration, and implementing new policies to bring the best and brightest to their countries.

There is real competition for bright minds out there. We're not winning this time.

### **Mixed Messages**

The availability of funding is always a barrier. And mixed messages about what we want our universities to accomplish with that funding doesn't help. The current mandate is that universities must educate students for less money. On the other hand, they need to spend more time in the labs creating and commercializing research. Teaching and research do not need to be exclusive of one another.

But research does cost money, and the state is not forthcoming with it. A small amount of money and clearly stated incentives would go a long way. The Emerging Technology Fund has assisted in this effort with early-stage funding, but faculty report that more is needed, at an even earlier stage. The Emerging Technology Fund, however, continues to attract naysayers, even when it assists with university research.

### **Creating a Biotech Cluster**

The largest and most controversial use of the Emerging Technology Fund was in 2009, when Governor Rick Perry, with the consent of the speaker and the lieutenant governor, transferred \$50 million from the Enterprise Fund to the Emerging Technology Fund, and awarded those funds to Texas A&M University. The grant helped create the National Center for Therapeutics Manufacturing, a prototype for accelerating the nation's ability to create vaccines.<sup>52</sup>

The National Center for Therapeutics Manufacturing is one of three pieces of the establishment of a biomedical cluster. The Center was brought about to help close an anomaly in Texas--the state was one of the top three states in biomedical research expenditures, with over \$1 billion in National Institute of Health money. Yet there was an absence of major pharmaceutical companies and successful biotechs located here. Which meant that our successful research was providing jobs for other states.

Scientific achievements are made in phases. First is the basic discovery phase, such as the finding that a particular gene in a mouse is found to be associated with autism. The next phase, intermediate or advanced development, takes approximately fifteen years, as continued research attempts to get the discovery to the next phase, clinical trials. This fifteen year intermediate period is where the money is spent, where problems are solved, and where value is created. Texas has lacked the pipeline to bring a discovery to fruition. Instead, Texas researchers have licensed their discoveries to other companies. If these discoveries are particularly good, they become competition with a line already in existence with the purchasing company. As any business with profits in mind would do, the new discovery is frequently shelved. And everyone loses.

In response, Texas A&M founded the first portion of a cluster, the Texas Institute for Pre-Clinical Studies (TIPS), now the leading international site for large animal, good laboratory

practices studies. In two years, over 130 companies who need such testing have contacted TIPS. Previously, those companies went to other states such as California for testing, or overseas.

The second piece is manufacturing, which is where the A&M grant for the National Center for Therapeutics Manufacturing comes into play. The creation of the Center in 2009 was pivotal in attracting \$176 million in federal grants to establish the most capable vaccine manufacturing facility in the world. Remembering the H1N1 vaccine shortage, the federal government wants to be certain that the next time large doses of any vaccine are needed, the United States will be able to deliver. And in the very near future, that delivery will come from a center in College Station, Texas, that will have the capability of producing 100 million doses of vaccine each month. That original \$50 million investment is expected to lead to the creation of 1,000 jobs, and create a "third coast" in biopharmaceutical manufacturing.

The third piece of the cluster, the already established Texas Institute for Genomic Medicine, means that Texas should become a major player in the biomedical field. The Institute has received \$12.25 million from the Department of Defense to work on new vaccines and therapies that could be used to counteract biological threats faced by military personnel and civilians in the event of a bioterrorism attack.

Texas has come to bat often, and produced a lot of base hits. That \$50 million investment in 2009 has resulted in a bases-loaded home run.

## **Recommendations**

Consideration should be given to creating a seed fund to assist research faculty with viable ideas to begin start-ups. If such a fund is created, the state should receive an equity stake, and the seed fund should be administered and awarded by an independent group. The Emerging Technology Fund's use of the regional councils of innovation and commercialization would be a model for this effort.

Although the university has independent offices of commercialization and technology transfer, this burden may be too much for the university. Consideration should be given to allow universities to hire outside council to evaluate their patent disclosures. This would eliminate the "playing favorites" game that exists inside political institutions. However, if universities opt to keep individual tech transfer offices, individuals making the decisions on whether or not a new invention goes forward towards commercialization should have incentives; perhaps bonuses for successful startups.

The Legislature should consider tasking an agency with evaluating and cataloguing the state's inventory of lab space, wind tunnels, or any other specialized equipment or space that could be used by a university or leased to a private entity for research purposes. Once completed, the legislature can determine what holes exist, such as the lack of research parks, and determine further actions to take.

## Small Businesses



## **Hand Me Another Brick: Building the Economy with Small Businesses**

*"70% of small businesses have no plans to hire or expand their staffs in the next 12 months. They are citing economic uncertainty as their biggest challenge."<sup>53</sup>*

*"The drought has reduced the amount of grass available at the farm, and that means the chickens are producing fewer eggs. The Del Valle farm is selling...about nine dozen eggs per week, compared with the normal 75 to 100 dozen."<sup>54</sup>*

*"SBA Declaration #10203/10204 - Hurricane Rita: Small Businesses may apply for Economic Injury Disaster Loans to cover working capital needs."<sup>55</sup>*

Tornadoes, wildfires, computer crashes, unreliable employees. If you want to own a small business, you have to really, really want it.

Small private businesses represent 99.7% of all employer firms, employ just over half of all private sector employees, pay 44% of the total U.S. private payroll, and have generated 64% of net new jobs over the past 15 years. In the U.S. in 2007 there were around 6 million companies with workers on the payroll, and ninety percent of those businesses employed fewer than 20 people. Collectively, these "under-20" companies accounted for 20 percent of all jobs.

Most of these companies will remain small. And that is precisely their intent. Many have started small businesses not for money, but for flexibility and freedom, with no plans to grow.<sup>56</sup> For many business owners, it's not just their job; it's the core family asset, their livelihood and their retirement. Communities depend on these private businesses for jobs and revenue flows that fund schools, create new jobs, and form the economic backbone of the community. Without these businesses, communities crumble.<sup>57</sup>

Businesses that have no intention to grow have basic needs. They need affordable rent and utilities. They need reliable employees. They need governments to consider the impact of their rules and regulations on smaller enterprises. For instance, an "environmental cleanup" of an oil stain left by a truck in the parking lot of a sandwich shop is more problematic for that small business than it would be for a larger corporation.

Small businesses would also like lawmakers to keep their tax burden in mind.

### **Taxes**

*"Even when tax breaks are factored in, American corporate taxes are among the highest in the industrialized world."<sup>58</sup>*

*"What happens is you have a small business who hasn't had a very good year. They haven't been profitable...but they still have to come up with that tax payment in May. And what they are doing is taking out loans...to pay that tax bill. You want to see them taking out loans to actually invest in their business, not to pay their taxes."<sup>59</sup>*

Although there is nothing we can do about federal corporate taxes, the state's margins tax continues to be an issue with small business owners. Many of them have seen their taxes double. In addition, many of them are no longer able to fill out the tax forms on their own; the complexity of the forms has required the added expense of an accountant.

When the National Federation of Independent Businesses surveyed their Texas members, 82 percent of those responding said they would like to see profitability of their business taken into consideration.<sup>60</sup> Challenges to the margins tax have been made to the Texas Supreme Court, charging that the tax does not fall on an equal and uniform basis on business.

Another new challenge for businesses is health care. Small businesses with at least 50 full-time employees will now have to contend with the health care tax. A company in this situation will have to provide insurance to cover at least 60% of health care expenses, and the insurance must cost the employee less than 9.5% of his or her family's salary.<sup>61</sup> Penalties for failing to comply are hefty. If you are a small company with fewer than 50 employees, this is strong incentive NOT to expand. And we very much need some of them to expand.

### **Small Business Assistance**

Small business ownership is a lot more than just opening a shop and selling stuff.

There are taxes to pay, and employee disputes to settle. There are economic issues like profitability, and policy issues like mandatory health care. It can be bewildering to navigate the regulatory issues, when all you want to do is be your own boss, and earn a decent living. It can be difficult for small business owners to know where to begin, to even know how to ask for help.

Looking for help can also be daunting when you are a small business owner who is an immigrant, which surprisingly, many are. There are 900,000 immigrant small business owners in the United States, 18 percent of the 4.9 million small business owners overall. The immigrant share of small business owners is higher than the immigrant share of the overall population (13 percent) and the immigrant share of the labor force (16 percent). More than half of these small businesses have at least one paid employee in addition to the owner.<sup>62</sup>

There is assistance available to small businesses, but asking the right questions to get the help needed takes time out of an already busy day of just trying to make a go of it, to survive.

The South-West Texas Border Small Business Development Center Network is an excellent model of accomplishment. Serving a 79 county area, the service centers provide professional business counseling, training and research. In testimony before the committee, officials of the SBDC Network indicated that it is not unusual to assist one small business for many years; leading the business through start-up issues, growth, and export regulations. Funded in part through the U.S. Small Business Administration, officials at the center estimate that during the fiscal year 2010-2011, they provided business advising to 21,000 businesses throughout the state. Centers all over the state assisted 63,000 individuals during that time frame, generating \$813 million in sales for their clients, and creating 8700 jobs.<sup>63</sup>

The Texas SBDC Network is hosted regionally by institutes of higher learning, and has many partners, including community colleges, chambers of commerce and economic development entities. Business seminars offered by the Network cover a wide range of issues such as business start-up essentials, technology advice, selling on e-bay, and federal government contracting.

But it's the one-on-one advice that should be of real interest to a small business owner. The SBDC Network in Texas uses its full-time offices, satellite locations and circuit riders to meet with owners and provide needed assistance. Their connection with the host universities also enables the SBDC to provide customized market research.

So we've got a good thing going. Expansion is what is needed. Both for the SBDC and small businesses that show an interest.

In addition, assistance is available from many community colleges, and member organizations like the TAB and the NFIB.

### **Encouraging Growth**

*"We're not looking to go public. You won't find us on the cover of Forbes magazine. We'll never be famous. We're making a living. And there's nothing wrong with that."<sup>64</sup>*

Most small businesses are not intended to become the next huge corporation. But their impact on the economy is important. And we could use a lot more people who, but for a little encouragement, might open their own businesses. They are probably already in our state. And they don't even know it.

### **Texas Veterans**

Successful entrepreneurs have many skills. They are disciplined, hard-working, and excellent problem solvers. They are risk-takers who work until their goals are reached. So are our returning veterans.<sup>65</sup>

As of 2002, three million veterans owned part or all of a business, and 811,000 of those businesses employed other people. According to the National Veteran-Owned Business Association, one in seven veterans owns a business, and veterans are twice as likely as non-veterans to own a business.

Efforts to assist returning veterans should be more than job fairs. Veterans should be made aware of resources that are out there to help them own and operate their own businesses.

These efforts should include those who are disabled. Texas A&M University offers an Entrepreneurship Bootcamp for Veterans with Disabilities in the summer. Training in entrepreneurship and small business management is provided. Greater awareness of these programs needs to be made.

## **Immigrants**

From 1995 to 2006, immigrants founded or co-founded one-fourth of all technology and engineering companies in the country. These immigrant firms comprised less than one percent of all companies founded during this period, yet accounted for close to ten percent of job creation.<sup>66</sup>

Immigrants contribute greatly to innovation. These new Americans choose to uproot their lives and relocate, making them ambitious risk-takers by definition. Many of them are trained in the STEM fields (science, technology, engineering and math), areas of study that are not currently popular with native-born Americans. In fact, immigrants account for 12 percent of all Americans, but 26 percent of America's Nobel Prize recipients and 24 percent of its patent applicants. When it comes to venture-capital backed companies, nearly half of the top 50 venture-backed companies in the U.S. count at least one immigrant as a founder.<sup>67</sup>

These immigrants create jobs for more Americans, too. A recent study has shown that every immigrant with an advanced degree from a U.S. university working in a STEM field creates 2.62 new American jobs. Encouraging the presence of highly-educated immigrants is desirable for any state. This country remains the best place for entrepreneurs, but other countries are quickly closing in. Other countries send their best and brightest to study at our universities, then bring them home to start their business. Not real smart on our part.

Drug war violence in Mexico is making the United States look attractive to Mexican entrepreneurs who want to create small businesses, but not pay protection money. They are bringing their families and capital northward. Between 2002 and 2007, the number of Hispanic-owned businesses in the nation increased by 43.7 percent to 2.3 million. Texas is home to 447,500 of these businesses.<sup>68</sup> A friendly atmosphere would keep them here in Texas.

## **Starting Young**

Youth employment is at a 60-year low. Student-loan debt is approaching \$1 trillion. According to a 2011 survey, however, their optimism is unflagging; as evidenced by the fact that 23% of young people started a business as a result of being unemployed. If the recession has failed our young people, they haven't failed themselves.

In the same survey, 88% of young people said that entrepreneurship education is vitally important, especially given the new economy. Yet 74% of college students had no access to such resources on campus.<sup>69</sup> But subjects such as entrepreneurship should be taught even earlier--in high school.

Adaptability and creativity are core elements to entrepreneurship; which itself is learned through career and technology education.

## **Small Business in Hyper-Drive**

*"States and their citizens are better off encouraging the formation and growth of new companies, rather than pursuing the timeworn and cost-ineffective approach of competing for the headquarters and/or expansion of existing firms."*<sup>70</sup>

*"America is a vast country made up of hundreds of diverse economies. The flexibility to match local strengths with global needs will be paramount. It is local knowledge and local energy--among local officials and individual business people and entrepreneurs--that will make the difference. Washington can focus on a few overriding national priorities, but most of the new ideas, new companies, and new jobs will come from local initiative."*<sup>71</sup>

*"The trouble is that government programs aimed at helping small businesses usually help the wrong kind. Many of these outfits were never meant to generate employment for anyone but their founders."*<sup>72</sup>

The small businesses that really make the data sing are the start-ups. Statistics show that in a study of millions of companies over thirty years, small businesses no more than five years old, which is about forty percent of all small businesses, are the only ones that create more jobs each year than they cut.<sup>73</sup>

We depend on startups to keep our economy moving. They have been the difference between positive and negative overall net job growth in the United States. However, their numbers are shrinking. In the 1980's startups created an average of 3.5 percent of total U.S. jobs. In the 2000's, they accounted for only 2.6 percent of the total U.S. jobs.<sup>74</sup> Fewer businesses are surviving more than five years, a trend that began before the Great Recession. And those that are surviving are employing fewer people.

And those businesses are not, for the most part, innovators. Most new small businesses do not intend to attempt to bring a new idea to market. Instead, most intend to provide an existing service to an existing customer base. And although government should consider assistance for small businesses in the form of lower taxes and regulations that make sense, there is no obligation to actively finance their endeavors.

### **Please, Sir, Can I Have Some More?**

Start-ups themselves are not created equally. Small businesses with new technology, new innovation and new ideas put the economy into a faster, "gallop" mode. These "gallopers" represent a small fraction of startups, but generate a majority of new jobs. These are the small businesses, that with the right encouragement, will grow to be something really special. Their technology and ideas will create the next large corporations that will employ lots of people.

So obviously, it is desirable to encourage those start-up small businesses that have the potential to run really hard. Consider this another plug for the Emerging Technology Fund. The ETF is all about finding entrepreneurs, and helping them gallop.

If the next big thing is currently underway in someone's garage in Texas, it makes sense for the state identify these entrepreneurs and assist them with an equity stake. Doing so is a lot cheaper than attempting to lure that business to our state once it has matured. The Emerging Technology Fund is all about growing our own next big thing.

An example is Xtreme Power, based in Kyle. The company has discovered a way to store generated power for later use by the grid. This groundbreaking technology eliminates the need for power companies to walk a tightrope of trying to guess when power might be needed, and gearing up to produce it. Reliable storage means that Texans would no longer have to wonder if their air conditioning could fall victim to a rolling blackout when temperatures exceed one hundred degrees. It's our very own Microsoft.

Unfortunately, the level of risk that must be taken to bring a new innovation to market is not for people with sensitive stomachs.

### **Creativity Isn't Always Pretty**

*"States and their citizens must become comfortable with the inherent messiness and turbulence of entrepreneurial growth: It is part of the process that some new firms will grow, while others will die or shrink. On balance, however, the evidence is clear: Entrepreneurial growth is key to the growth of net new jobs and of major advances in living standards."<sup>75</sup>*

The Emerging Technology Fund is a lot like raising a small child. Just when you get the child perfectly positioned on Santa's lap for that great photo, he starts screaming. If you were standing by at that awkward moment, you would think that this child really wasn't worth it. But most parents overlook those kinds of moments -- the good outweighs the bad. Some of the businesses that the state invests in will fail. But those that succeed will contribute to the economy.

If the state wants to invest in only "sure things," it should reconsider its commitment to public education. The money invested in public education does not result in 100 percent successful students. Under that criteria, the ETF has been more successful than public education.

The Emerging Technology Fund is a child. It is the taxpayer's child, our investment. And it should be treated as such. It is not a government handout, or a freebie. And if the government's role is to create an environment that encourages the formation of new businesses, to then create jobs, then it must be realized that the ETF is one way of creating those jobs.

Our investment should be protected. And legislation aimed at the ETF should keep this in mind. For instance, our fund is currently the most transparent in the nation. Other states with similar funds do not put any information about the companies that they have assisted on their website that they would consider helpful to the competition. There is no need for our state to push the transparency issue any further.

And the good news: Our child is growing and maturing. Our equity stakes are beginning to pay off. Money is starting to come back to the fund as successes are realized.

## **The University Connection**

We need to grow entrepreneurs. We have the brains and the talent at our universities. The problem has been bringing those new discoveries made by faculty and students to commercial market. We need to expand entrepreneurial education at state universities and community colleges.

In the past, entrepreneurial education in our universities was mainly requiring student researchers to write a business plan. Today, however, universities are successfully experimenting with a concept connecting students with business information as they need it. In this model, students are given hands-on direction through every step of the process of creating a business, including connecting student entrepreneurs to local mentors.<sup>76</sup>

Texas higher education is beginning to respond to this model. Texas State University is planning a 38-acre research park specifically to create companies and jobs from the work being done in college labs. The Science, Technology and Advanced Research Park's first building is a 20,000-square-foot building with offices, web labs and clean space necessary for startups focused on the nanomaterials research pursued by the university.<sup>77</sup> Texas State also has a new doctorate program that combines science and business courses, enabling graduates to learn how to start a company with their own research.

The Austin Technology Incubator, along with non-profit groups, hosts a startup boot camp every semester. The students, who have to apply through an application process, spend three days working on potential startups, presenting them to business professionals and receiving valuable input on the viability of the idea. Thus far, a dozen companies have received funding to work towards the next level of business creation.<sup>78</sup>

Rice University works with large industries, such as Lockheed Martin, to discover better ways to build airplanes. That connection has helped to create small businesses that act as suppliers to Lockheed Martin. Students studying science are encouraged to take business courses to learn how to create start-ups from their discoveries.

## **Exports**

According to testimony received by the committee, some small businesses need to eventually think bigger. And one of the most effective ways to do that is through exports. In 2011, for the tenth year in a row, Texas was ranked the top exporting state by the U.S. Department of Commerce. All businesses with goods to sell, including small ones, should be encouraged to consider exporting.

In 2009, small businesses comprised 92 percent of Texas' 26,265 exporters.<sup>79</sup> Texas exports of fuels, computers and other goods in 2011 amounted to \$249.9 billion, far ahead of its nearest competitor, California, with \$159.4 billion.<sup>80</sup> Our biggest buyer was Mexico, with \$86.6 billion. Canada came in second with \$21.9 billion. Other countries making the top ten receiving exports from Texas were China, Brazil, Netherlands, Republic of Korea, Singapore, Colombia, Japan,

and Belgium. Even in tenth place, Belgium purchased \$4.1 billion in exports from our state, which isn't pocket change. When goods are exported from Texas, jobs are created in Texas.

According to the Kauffman Foundation's 2008 State New Economy Index, businesses that export goods or services out of the region are the ones that matter most. If a local firm, such as a barber, goes out of business, another firm will emerge, or existing barber shops will expand, because local residents will create the demand. However, local demand for cars, computers, insurance services or banks can be met by suppliers out of state who ship their goods into the needed area. Texas needs to be the one shipping out, not receiving goods from other states.

New opportunities are going to be presented by the nearly completed expansion of the Panama Canal in 2014. The Canal will allow supersized cargo ships, carrying greater amounts of goods for the United States, to head for Texas and other United States ports equipped to handle them. Texas ports, if well equipped with infrastructure to handle those loads, will be attractive to those shippers who are weary of West Coast port labor issues. Loading those supersized ships with Texas goods for the journey back would be an incredible boost to our state's economy.

Right now, however, most small businesses remain in "maintenance" rather than "expansion" mode as owners continue to reduce their inventories. NFIB Small Business Economic Trends for June 2012 show that business owners remain uncertain about estimating future sales, tax rates, labor costs, health care costs and regulatory compliance costs due to political unknowns. Developments in Europe also remain a concern.

## **Funding**

*"The food of entrepreneurship is capital."<sup>81</sup>*

Most businesses are not expanding right now, so funding is not an issue. But it eventually will be again. Venture capital for small businesses created around new innovations remains sluggish in Texas.

Another troubling trend for small businesses is the reduction of the number of independent community banks. These small, locally owned banks have always been more friendly with small business loans than large corporate banks. In the same way that one-size-fits-all regulations are harder for small businesses to manage, new regulatory pressures since the financial crisis of 2008 make it more difficult for these smaller banks. The number of independent community banks nationwide continues to drop.

The gap could be filled with credit unions. Credit unions have a lending cap, however, which will hopefully be addressed by Congress in the coming months. Removing the cap would increase the lending opportunities for small businesses.

The Emerging Technology Fund and the Cancer Prevention and Research Institute of Texas fund certain startups, and The Texas Department of Agriculture (TDA) has joined in that effort with its administration of federal funding through its Jobs for Texas program.



Created by Congress, the State Small Business Credit Initiative is intended to spur \$15 billion of private lending for small business. Although the TDA has oversight of the program, the funds are not only for rural businesses. The agency contracts with two private firms to help with the structure of the individual businesses. Applying for the funds is a competitive process, and the state, in exchange for a portion of the startup financing, receives an equity stake in the business. Much like the Emerging Technology Fund.

Although the successful investments are expected to outnumber failures, the TDA has projected that the \$36 million fund would most likely lose \$2.2 million, but would create 2,558 jobs with an average salary of \$57,784 with the remaining monies.<sup>82</sup> As with any investment, there will be losses, but the gains are forecast to far outweigh them. It has also been anticipated that the government investment would attract almost \$500 million of private capital.

### **Texas Friendly Enough?**

The 2011 Small Business Survival Index lists Texas as the third friendliest state for small business. Although our state ranks poorly in property taxes, health insurance mandates and crime rates, we more than make up for it with top scores on the taxing side: personal income tax rates, capital gains tax rates, corporate income tax rates, gas and diesel taxes. We fall to the middle of the pack when it comes to state and local debt and five-year spending trends.

Third place isn't bad, but policy makers should never take our ranking for granted. Any legislative tweaks should not be at the expense of those elements that keep our overall rank high.

The goal should always be economic growth. And real and sustainable economic growth is generated by creating incentives for businesses to compete and to discover the most efficient ways to provide goods and services consumers demand.<sup>83</sup> Creating an environment for that to happen is key.

### **Recommendations**

Although expansion of small businesses is crucial to growing our economy, monetary government involvement should be targeted towards those small businesses that actually want to grow. When considering policies for these types of businesses, lawmakers should not consider the entire universe of small businesses. Rather, lawmakers should narrow their focus to specific businesses, such as those actively seeking venture capital. And of those businesses, the sample should be confined to those businesses with new and innovative technologies that have the potential to become a major player.

Businesses that do not possess ground-breaking technology, but still have products to sell should be heavily encouraged to consider export markets.

There are a lot of resources for small business in Texas; the problem is that they are not connected. The Regional Centers of Innovation and Commercialization, created to vet Emerging Technology grants at the local level, should be in regular discussions with the Small Business Development Centers. The universities working toward commercialization of their lab

discoveries should be talking to the Agriculture Department and its private lending for small business program. Best practices should be developed, websites should be created, alliances should be made. Consolidation of small business resources and a point of contact should be created.

The state should try harder to brand itself as immigrant friendly. This is not a call to open our borders to illegal aliens. But legal immigrants willing to spend their money creating businesses and jobs in our state should be encouraged to do so. Being able to connect these immigrants to each other through local networks before they arrive would go a long way to enabling them to create a community in Texas.

More than eighty percent of small businesses struggle with late payments. If you owe a small business money, pay up.

## Automotive Assembly Plants

## Creating New Coalitions: The Automotive Industry in Texas

*"The single biggest driver in North American trade is the powerful upward sweep of the recovery of the U.S. and North American Auto industries. U.S. new car sales ended 2011 on a tear, up to a 15.1 million annual new car sales pace, the highest in four years, since before the collapse to a decade-low annual new car sales rate in the U.S. of 9.1 million registered at the bottom of the 2008-2009 Great Recession."*<sup>84</sup>

*"Indeed, the motor car has become so commonplace that we regard it rather in the light of a piece of household equipment, scolding about its shortcomings and seldom, if ever, giving thought to the fact that here, in exchange for a comparatively few dollars, we have come into possession of the most perfect saver of time, money, energy and ennui ever produced by the mind of man."*<sup>85</sup>

*"When you include all the parts suppliers and the auto dealers, the auto industry directly employs 85,000 people in the state of Texas. Those 85,000 direct jobs help support another 115,000 jobs, bringing 200,000 jobs in the state that are supported by the presence of the auto industry here."*<sup>86</sup>

In the 1950's, a young chamber of commerce president in a farming town set out to change the world around him. Picking up a tip that General Motors was looking to build an assembly plant in middle America, he realized that a higher office might be the key to get through the major automaker's switchboard. So 25-year-old Tom Vandergriff ran for mayor and acquired a GM plant. Although persistence won the day, charisma surely played a part.<sup>87</sup>

Nearly 50 years later, Toyota announced the search for a site to construct a plant to build Tundra trucks, and Texas was dead last in consideration. The only reason the state made the list at all was a large built-in pick-up truck market. Unlike other states, Texas did not have the incentives in place to lure a large project. State officials hurriedly duct-taped together a package of leftover job funds, some federal job-training funds, local incentives and turned on the charm. The legislature, which just happened to be in session, put forth an emergency spending bill to authorize the deal.

Two automotive assembly plants arrived in this state in two very different ways. And there could be a chance for more. Three years after the U.S. auto industry nearly collapsed, and plants were closed, sales of cars and trucks are surging, putting strain on the workers and plants that remain. In addition, foreign automakers are now shifting production to the United States because of higher sales and the weak dollar, which cuts the profits they get from selling vehicles exported to America.<sup>88</sup>

In the short term, U.S. automakers will make do with the plants they have. But long term, an opportunity may present itself. However, opportunity no longer knocks on your door, it is waylaid by other states before it even gets up the front walk.

How can Texas compete for automotive assembly plants in the near future? What are our weaknesses, and how can they be addressed?

## **The Value of an Assembly Plant**

*"GM pays \$1 million in wages every day at Arlington Assembly, and in 2010 alone GM paid more than \$38 million in manufacturing payroll and property taxes to the state of Texas."<sup>89</sup>*

As America slowly emerges from the Great Recession, the auto industry is leading the way. Toyota has just added a shift to its plant in Mississippi to crank out more Corollas. Honda is pouring money into Ohio. Chrysler is adding 1,800 jobs in Illinois to assemble its new Dart compact. General Motors in Arlington recently announced the addition of a third shift and 800 more jobs. The math of car manufacturing dictates that each one of those jobs will create four more, as suppliers also ramp up. Transporters will also see increases. Union Pacific Railroad, which carries the steel for those cars, plans to hire more than four thousand people this year.<sup>90</sup>

Motor vehicle and parts manufacturing are the second largest manufacturing employer, behind computers and electronics manufacturing. Automobile manufacturing, however, is number one in creating related jobs. The industry also invests heavily in research and development, a plus for a state that does not offer R&D incentives.

The two main light vehicle assembly plants in the state of Texas directly provide high-paying, high-skill level jobs for over four thousand Texans. Those assembly plant jobs support another 24,000 parts and suppliers jobs. But automotive math multiplies exponentially to dealers, transporters, and other support services. An automotive assembly plant is the gift that keeps on giving.

Both General Motors and Toyota have made, or are in the process of making, capital improvements to their sites. GM in Arlington is completing a \$330 million expansion to the plant. Toyota's original investment in the San Antonio plant was \$800 million, today it is \$1.2 billion. Both plants have large payrolls, pay property and payroll taxes.

Nationwide, over 1.7 million people are employed by the auto industry. In addition, the industry is a huge consumer of goods and services from many other sectors and contributes to a net employment impact in the U.S. economy of nearly 8 million jobs. People in these jobs collectively earn over \$500 billion annually in compensation and generate more than \$70 billion in tax revenues.<sup>91</sup>

## **Supplier Impacts**

*"Every day...our GM plant buys parts from over 600 companies just to assemble in Arlington the dashboard assembly of some truck in the assembly line put in place about two hours before that body comes down."<sup>92</sup>*

An automotive assembly plant is a prize, but it is the charm on the bracelet, the bonus. It's showy and impressive, but the bracelet that holds it is the prize. The links of the bracelet are the suppliers. When Toyota came to San Antonio, forty other businesses gradually joined them. Forty businesses that wouldn't have existed but for the presence of Toyota.

When an automotive plant puts together a car, it does not manufacture all of the parts that go into that car. Those parts are supplied by a vast network of suppliers. The suppliers are a network of those who provide the raw materials, convert them into finished products, and deliver them to the needed site. In the past, most of the manufacturing of parts was done on site at the assembly plant, but as cars became more complex, requiring larger numbers of parts, manufacturers and suppliers of those specific parts located away from the "alpha" plant and grew into their own industries. Those parts suppliers, in turn, supported the growth and stability of many other industries, such as basic materials suppliers of steel, plastic, rubber and glass, which are used for making parts such as interiors and trim, tires, gaskets and windows.<sup>93</sup> Although the auto plant may assemble the puzzle pieces into a finished product, the pieces are manufactured and come from all over.

Up until the tsunami in Japan, it was assumed that a part could be built anywhere, and "borderless" manufacturing was popular. Products were manufactured from parts that were made in different places all over the globe, and shipped to one place for assembly. Japan is a major manufacturer of "stuff that goes into other stuff," and the disruption caused by the tsunami caused supply chains to be broken all over the world.<sup>94</sup>

Another example was the explosion of a plastic resin plant in Germany, causing a shortage of that crucial component for car manufacturing. You can't put a car together in an assembly plant if the parts aren't all there.

When the 3,000-plus parts that go into the making of an automobile are needed at an assembly plant, they are needed NOW. For them not to be on-site when needed is to waste time, money and workers. To hold down inventory costs, assembly plants no longer warehouse supplies. Depending on the commodity needed, some of those suppliers need to be close to the plant, and some can be further away, as long as they are there when needed. For instance, General Motors in Arlington receives 400 trucks a day, all loaded with supplies for the auto manufacturer.

However, if you are a supplier, it makes economic sense to locate where you can supply parts to more than one automotive plant. If, for instance, a supplier locates in Tennessee, that supplier can provide parts for plants in Georgia and Alabama as well as plants in the northeastern United States.

So the key is to have enough final assemblers here in the state of Texas to make it worthwhile for the suppliers to establish a permanent facility here and connect the supply chain. Aggressive pursuit of such assemblers makes supplier relocation in this state less risky and more cost-effective.

### **Texas is an Island**

One of the selling points of Texas is that large swaths of land are available to auto manufacturers to build plants. And one of our drawbacks is that we are a large state with large metropolitan areas separated by large areas of rural land. The plants located in the southeastern United States, and of course, the Michigan area, are close together geographically. So it's easy for a supplier to

service more than one or two assembly plants. Not so much here in the Lone Star State.<sup>95</sup> Even if you add similar industries like the Caterpillar facilities in Seguin and Victoria, and Boeing in San Antonio, you still don't come up with a dense, well-established supply chain for Texas.

At least, not in this country.

### **Can Mexico Come Out and Play?**

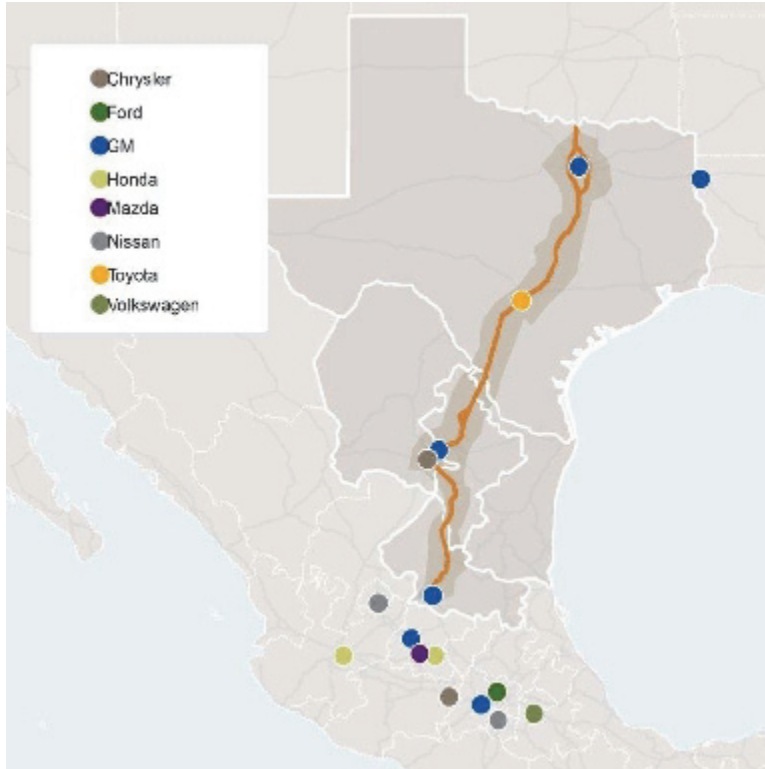
*"In 2007, Mexico was the third largest U.S. trading partner but perhaps more importantly, Mexico buys more from the U.S. than any other country except Canada."*<sup>96</sup>

*"The state of Texas, the U.S.' leading single export state, continued to lead all states in surface trade with Mexico at \$10.3 billion registered in December, up 8.7% from December 2010."*<sup>97</sup>

Turns out, there is a supply chain much closer to Texas. It's in Mexico. Our next door neighbor.

The economic ties between the United States and Mexico are reinforced by a large web of social networks. Thirty-two million U.S. residents, or one in ten, are of Mexican origin. Perhaps a million Americans live in Mexico, almost a fifth of all Americans who live abroad. Thirteen million Mexicans visited the U.S. in 2010, and 19 million Americans visit Mexico each year. A lot of Texas jobs, 463,000, depend on trade with Mexico.<sup>98</sup> We should be borrowing sugar from each other.

Since the 1980's, the traditional U.S. auto corridor radiating from Michigan has shifted towards the southern United States. All but one North American automotive plant built in the last two decades was located in a southern U.S. state or Mexico. Many foreign-owned automotive firms, such as Nissan, Subaru, Volkswagen, Mercedes-Benz, BMW and Kia, have located in the south, and influenced suppliers to locate near their new operations.<sup>99</sup> In 2010, about \$114 billion in international freight crossed through Laredo. Nearly half of it was auto-related.<sup>100</sup>



When you look at a map of auto manufacturing along the I-35 corridor (MX-85 and MX-57 in Mexico), it becomes apparent that the bulk of the Texas Mexico Automotive Supercluster (TMASC) Region is mainly in Mexico. Mexico ranks eleventh in the world in automotive production, and the quality of their work is globally recognized. In other words, Mexico doesn't need us. But together, we'd be a larger economic force.

Labor on both sides of the border complement each other. A plant located in Mexico is likely to be manual intensive, taking advantage of the cheap labor that the region provides. In the United States, the plant is likely to be more automated, creating higher-paying, higher-skills level jobs for Texas.

Manufacturers in Mexico have the advantage of a cheaper work force, but the United States has had more success in establishing supplier bases; mainly due to our available technology, government standards, and a skilled stable workforce. Logically, a manufacturing boom could be created with an automotive assembly plant in the South Texas area, supported by raw materials and subassembly manufacturing growth in Northeast Mexico.<sup>101</sup>

This fact has not escaped South Texas' notice. The McAllen Economic Development Corporation has spent the past two decades recruiting 60 auto suppliers to the region. In the McAllen/Reynosa area, over five thousand managers, engineers and other workers live in the United States and travel to Mexico for work every day.<sup>102</sup> The area has come close to landing an automotive assembly plant at least once, and the community should be given all possible assistance to land that prize.



It's time for South Texas to shine.

### **Postponed Manufacturing**

*Throughput: the amount of something such as data or raw material that is processed over a given period.*

A Texas-Mexico connection also makes sense because of the timing. Opportunities are becoming available due to a shift in world-wide costs. Prices for ocean containers and marine fuel have been volatile, swinging 40% for containers and up to 150% for fuel in some periods.<sup>103</sup> It's getting expensive to ship stuff from China. And the Chinese labor costs are going up. Actually, they were underestimated from the start, mainly due to training costs for Chinese middle management, a personnel concept that was previously unknown to the Chinese.

According to Dr. Barry Lawrence, Program Director of the Industrial Distribution Program and Supply Chain Systems Laboratory at Texas A&M University, the real solid proof of this is that Chinese firms are now coming to Mexico to do production, which tells you that the Chinese have recognized that shipping across the Pacific Ocean doesn't make sense. This trend, according to Lawrence, is something that firms on our side of the border should take note of.<sup>104</sup>

Research has shown that it is more cost-effective to construct a manufactured good as close to its consumer as possible. This brings into play the term "added value." For instance, it is costly to ship an entire washing machine from China to the United States. But to ship just the motor to Mexico, build the washing machine around the motor in Mexico, (thus "adding value") and ship the finished product to the United States for purchase is much more cost effective. Another term for this kind of manufacturing is "postponed manufacturing." That is, to put off some of the steps of manufacturing until the merchandise is closer to the final consumer.

### **Sharing the Assets**

Some of this is already happening. The United States, Mexico and Canada each produce and assemble auto parts, sending them back and forth as they work together to build complete cars. It is estimated that cars built in North America have their parts cross the United States borders eight times as they are being manufactured.<sup>105</sup>

Regionalization is another factor at play. Regionalization is globalization taking one step backwards. Globalization is best known as the process whereby barriers between national borders are removed to facilitate the movement of goods, labor and services. However, 9/11 triggered significant restrictions in the international flow of goods and individuals. And the recession of 2008 further reversed the trend as developed nations activated domestic job protection and import restriction initiatives. Add the rising cost of crude oil, and it appears that making friends closer to home would be beneficial to everyone.<sup>106</sup>

In addition, the United States has trade agreements with 20 countries; Mexico has free trade agreements with 41 countries and preferential trade agreements with another 43. Working together enlarges our market.

If you are a believer in postponed manufacturing, regionalization, and combining assets, then you can see how a Texas-Mexico alliance could create an industrial "sweet spot."

### **Research Strengths**

Texas is blessed to have two research institutes that can be of assistance to the automotive industry. The first, the Southwest Research Institute, has an Engine, Emissions and Vehicle Research Division, which conducts design, development, and test programs on a wide range of components, engines, transmissions and vehicles.<sup>107</sup>

The second, the Texas Transportation Institute, was established in 1950, and conducts research on design, construction and maintenance; passenger and freight movement; and pavements and materials. The institute is composed of eleven state and national research centers, and also hosts outside testing areas.<sup>108</sup> In the past few years, TTI has been responsible for a large portion of the license income received by the Texas A&M System. Examples of their successfully commercialized innovations include a guardrail treatment that improves the chances of drivers surviving a run-off-the-road crash and a breakaway sign support that allows vehicles to pass safely underneath after impact.<sup>109</sup>

Mention should also be made of TechComm in Arlington. TechComm is a partner intermediary to several federal agencies, including the Department of Defense, to enable the transfer of federal lab patented technologies to the marketplace. What this means for the automotive industry is potential access to the resources of 300 federal labs that spend over \$100 billion annually on research. Through that access, cooperative research agreements can be developed between automobile manufacturers and state universities with the federal labs that are doing research relevant to enhancements in safety or alternative fuel systems.<sup>110</sup>

### **Weak Spots - Workforce**

*"Eighty percent of our...high school graduates, we're sending to four year colleges, to fill sixteen percent of the jobs. We're upside down."*<sup>111</sup>

Manufacturing, at least on the United States side, relies on a skilled workforce that is getting harder to find. In the mid 1980's, society began preparing their students for jobs in "knowledge-based" vocations. College became perceived as the one pathway to success. And vocational education fell out of vogue.

Meanwhile, the state's population of skilled laborers is close to retirement, and there are not enough replacements for them.

It's important to note that today's manufacturing jobs are not assembly line jobs. There are not multiple workers screwing one little widget into one little part all day long. These are jobs where the workers oversee the computers and robotics that do the actual work. A working knowledge of high school math and the ability to troubleshoot and find solutions to problems are the key to these jobs and their solid middle-class paychecks.

One plus for the region: In comparison to other vehicle producing states, Texas and Mexico had younger populations in 2010 than every other state. By 2030, the median age for every other vehicle producing state (with the exception of Georgia) is expected to be 40 or over. An aging population affects the availability of labor.<sup>112</sup> And a younger workforce is more adaptable to learning new skills.

### **Congestion and Customs**

Much of the opportunity provided by the Texas-Mexico connection is a by-product of NAFTA. The North American Free Trade Agreement provisions include the qualification that any product of at least 62.5% American, Mexican, or Canadian parts be duty-free. And that has resulted in increased traffic.

Congestion is a problem, but not a deal-killer. Texas has not paid sufficient attention to its aging infrastructure of roadways. Automotive plants that receive 400 truckloads of parts a day need to be able to get those trucks to the plants in a timely manner. And as anyone who has idled in traffic in Texas knows, reaching your destination in a timely manner is not a sure thing. And in business, it HAS to be a sure thing. El Paso and Laredo continue to experience chokepoints, and additional infrastructure is needed. And even though our congestion is not a deal-killer, it is still something that should be dealt with as our state continues to grow.

Additionally, the political problems associated with cross border trucking traffic remain. A pilot program allowing trucks from the United States to enter Mexico and Mexican trucks to enter the United States past the 25 mile radius has ended. Although it was shown that those trucks participating in the pilot program were safer than other trucks on the road, the Teamsters suit has kept the program from expanding.

Mexico has responded by adding tariffs to goods coming into their country from the United States, as is their right to do, as the NAFTA treaty has been violated by our side.

Mexico has all of Latin America to trade with, and frankly, doesn't need us that badly. It would seriously behoove the federal government to settle this issue.

### **Tax Issues - Chapter 313**

Property taxes have a detrimental effect on large manufacturing-type businesses. According to Bill Allaway, Senior Advisor with the Texas Taxpayers and Research Association, Texas' reliance on the sales tax and the property tax is known as a "self-inflicted sore thumb," resulting in an extremely high property tax burden for capital intensive businesses.<sup>113</sup>

The state's solution to this is a tax code that allows local entities to offer tax abatements and tax increment financing. These tools allow the state to chip away at the burden caused by high property taxes. But the largest hammer is Chapter 313 agreements, created to take on the larger share of the burden, school property taxes.

The purpose of HB 1200, the Economic Development Act, was to authorize school property tax incentives for a period of eight years for major developments that would bring specific employment numbers to the region, and to hold the school districts harmless for those incentives.

The original legislation required the business to be devoted to manufacturing, research and development, generally considered large-scale operations that hire larger numbers of employees. In non-rural districts, a minimum of 25 jobs must have been created, in rural districts, ten new jobs.

Supporters say the program has been a success. Through the beginning of 2009, 90 projects involving over \$40 billion of new investment and an estimated 5,600 high-wage jobs have qualified for Chapter 313 agreements.<sup>114</sup>

Tweaks to the legislation have been made over the years, mainly to address the hold harmless provisions for the school district, and to amend the wage targets. Criticism of the Chapter 313 agreements continue for various reasons, mainly because of the wind industry, and its perceived lack of created jobs. A perception that those who have benefitted from wind industry-related jobs would be quick to refute. As long as the jobs created as offshoots of the jobs targeted with Chapter 313 incentives aren't counted, we will never have a complete realistic employment picture.

### **We Don't Tax People**

Jobs are great, and they should be a main focus of bringing industry to our state. But it shouldn't be the only focus.

There is no income tax in Texas. We don't tax people. We do, however, tax capital. We tax large structures on the ground. So it makes sense to do whatever it takes to attract those large structures in any way possible. Chapter 313 should not be considered a provider of jobs, although those jobs have been a nice side benefit. The purpose of Chapter 313 agreements should be to get taxable structures on the ground, structures that will eventually pay taxes. If they need to be given a freebie for a few years to get them to Texas, then that is what needs to be done. In 2010, General Motors in Arlington paid \$6 million in property taxes for their facility in Arlington. They recently announced a \$330 million expansion of the plant.<sup>115</sup>

As a comparison, our surrounding states are being very aggressive. The effective property tax rate in Texas is about 2.5 percent. In Louisiana and Oklahoma, it's about one percent. In New Mexico, it's about three-quarters of one percent. These rates do not count the incentives that our surrounding states are willing to throw on the table. These are hungry states, and manufacturing jobs are pure protein.

### **Freeport Exemptions**

Freeport property includes various types of property that are detained in Texas for a short period of time (175 days or less) to be transported out of Texas. The goods must be in Texas for certain purposes, such as assembly, storage, manufacturing, processing or fabrication.<sup>116</sup> This

exemption is considered vital to the automotive industry, and should be continued, if not extended for a larger period of time.

### **Wanting to be Wanted**

*"Politicians forget that business has choice. We're not indentured servants and we will do business where it's good and friendly. We've got a real choice between manufacturing in Canada and Mexico--which tend to be pro-business--or America."<sup>117</sup>*

Automotive companies want to be wanted. They want to be in communities where the citizens are glad they are there. If policies at the national level are making the United States less competitive globally, then it is up to the states to take up the slack. And Texans can be a friendly group.

In 1991, the Arlington GM plant was pitted against the Willow Run, Michigan plant. One would close. One would survive. The CEO of General Motors at the time decided in Arlington's favor because its political leaders and workers were willing to fight for the factory. Willow Run workers were so confident that they would stay open that they "didn't lift a finger." Arlington recently won again, with the landing of a \$200 million stamping plant.<sup>118</sup>

### **Recommendations**

The Tax Code allows cities and counties to establish reinvestment zones and enterprise zones, and allows cities, counties and school districts to offer tax abatements and tax increment financing to qualified businesses. These local entities must continue to be given that flexibility by the state, in order to be proactive towards achieving their own economic development goals.

Chapter 313 agreements must be continued to attract large, manufacturing facilities. If it needs to be tweaked, tweak it. But don't let it expire in 2014.

Americans have long believed that a four-year college degree was the only ticket to opportunity and success. Changing that long-held perception is not going to be easy. At the very least, high school students should be made aware that skilled labor is in demand, and the pay for such workers is comparable to that earned by those with college degrees, minus the student loan debt.

Although the Governor's office is to be commended for providing a democratic site selection process where any community can apply, a winnowing process needs to be developed for the location of automotive assembly plants. When site selectors want to see what Texas has to offer, they want to see two or three proposals. By opening up the process to all, site selectors are occasionally presented with a box containing thirty proposals. Not having the time or funding to examine all of them, the top three are taken. Those top three are not necessarily the best that Texas has to offer. Although this reportedly does not occur often, once is too many times. For large projects, winnowing must occur. All that being said, the evidence points to South Texas, along the I-35 corridor, as the prime location for an automotive assembly plant.

Many of the issues needing resolution to increase the flexibility of Texas-Mexico exports are federal issues. The pressure needs to be kept on Congress to do what is necessary to decrease border wait times and simplify customs procedures.

## Cluster Initiatives

## **Leveraging Our Assets: Clusters**

*"For state legislators, one lesson at least is clear: No single entity can control the entire U.S. economy. Certainly, no single state policy--no tax break or big spending program--will magically return the economy to what it once was."<sup>119</sup>*

*"Properly designed, cluster strategies are a low-cost way to stimulate innovation, new-firm start-ups, and job creation."<sup>120</sup>*

Growing an economy is a tricky business. There are many possibilities and many variables. Although nearly everyone can agree that Texas needs to grow businesses, and thus, jobs, to provide for its citizens, the devil (as they say) is always in the details.

To know how to get somewhere, and what incentives (if any) are to be employed, you have to know where it is you want to go. Texas mapped out its destination in 2004 with the study and establishment of clusters.

According to Michael E. Porter, professor of Business Administration at Harvard, a cluster is a geographic concentration of interconnected companies and institutions in a particular field. Porter gives as an example the California wine cluster, which includes over 600 commercial wineries and several thousand grape growers. Supporting industries include suppliers of grape stock, irrigation and harvesting equipment, barrels, labels and wine publications, with weaker linkages to agriculture, restaurants and tourism.<sup>121</sup>

So for California, it makes sense to grow an economy based on a strong natural resource it already possesses. And as the grape turns into wine, and the wine turns into supporting industries, a cluster is born. And clusters attract interested parties who can share ideas to take the cluster even further.

### **Cluster Considerations**

Michael Cox, the director of Southern Methodist University's Center for Global Markets and Freedom in Dallas says, "there is strong evidence that clusters contribute to the productivity of the industry, boost the wages of workers in those industries, boost exports and increase the competitive atmosphere. When one company is located near another company in the same industry, they tend to share workers and share ideas."<sup>122</sup> In other words, people with common interests like to hang out with each other.

The advantages of clusters for the participating entities include access to innovation and knowledge. In a knowledge-based economy, companies look for their main competitive advantages in access to ideas and talent, which requires geographic proximity to professional colleagues, cutting-edge suppliers, discriminating customers, highly skilled labor pools, research and development facilities, and industry leaders. Clustering gives firms quicker information about advances in technologies and changes in customer or consumer preferences. Clusters created by like-minded businesses create more businesses.



Clusters can also lead to further economic development opportunities. The advantages of being together draw similar and complementary enterprises; with encouragement, these enterprises can ultimately breed other clusters. The textile cluster in South Carolina attracted enough machine and tool builders to also become an industrial machinery cluster. A new media cluster was created in New York City with the conversion to Web-based printing, publishing and advertising.<sup>123</sup>

Similar enterprises created by clusters attract small businesses, too, the ones we need to lift us out of the recession; and their collective contribution is large. As an example, small businesses directly employed 147,862 in Texas' biotechnology cluster in 2006, and indirectly provided another 200,000 jobs.<sup>124</sup>

Identifying clusters can also be economical from an incentive standpoint. When states target job creation and financial incentives towards clusters, rather than individual businesses, it can be more cost-effective in the long run.

Diversity of clusters is an important consideration. Iceland's economy boomed short-term with the development of a financial cluster, but once that failed, there was nothing else to lift them out of an economic hole. Fortunately for Texas, the state has identified multiple cluster opportunities as good investments for our future.

## **Texas Clusters**

Texas began to seriously consider clusters as a way to diversify their economy in the 1980's when the price of oil dropped to about \$8 a barrel. For every dollar dropped, (from a high of about \$86-\$88 a barrel) the state lost \$100 million in available revenue to provide for its citizenry. Obviously, something had to change.

A study conducted by Porter and Texas economist Ray Perryman, working in conjunction with the Texas Workforce Commission, identified six key clusters as vital to the state's economic future:

- The Advanced Manufacturing Cluster (with four sub-clusters)
  - Nanotechnology and Materials
  - Micro-electromechanical Systems
  - Semiconductor Manufacturing
  - Automotive Manufacturing
- The Biotechnology and Life Sciences Cluster
- The Aerospace and Defense Cluster
- The IT/Computer Technology cluster (with three sub-clusters)
  - Communications equipment
  - Computing Equipment and Semiconductors
  - Information Technology

- The Petroleum Refining and Chemical Extraction and Manufacturing Cluster
- The Energy Cluster (with three sub-clusters)
  - Oil and Gas Production
  - Power Generation and Transmission
  - Manufactured Energy Systems

This committee was charged with examining the individual clusters, making recommendations as to whether or not the clusters are still viable, and determining what is needed for their continued success.

### **Advanced Manufacturing - Making Our Own Stuff**

*"Growing the private sector with good paying jobs requires that we restore the manufacturing sector in America."<sup>125</sup>*

Manufacturing is addressed more extensively in separate sections of this report. Specifically, in the committee's charges dealing with automotive manufacturing and an examination of the state's manufacturing capabilities.

But briefly, our advantages in this area include the state's relatively low labor costs, available land, and the proximity of Mexico-based suppliers. However, our lack of skilled labor continues to be a challenge. A serious mind-set change in vocational education in public schools is crucial for the provision of future workers.

Many manufacturing jobs are coming back to the United States, due to shipping costs and the capriciousness of other countries. Since 2010, the percentage of U.S. executives who have moved production back home has risen from 12% to 22%. One in three is studying the proposition.<sup>126</sup> These are solid, middle-class jobs that pay well. To continue to thrive, Texas must get its share of these jobs as they return home.

In addition, it should be stressed that clusters interact with each other, and push each other economically. For instance, for biotech and life sciences to really succeed, Texas should be able to manufacture the new products discovered by that cluster. To have them manufactured out of state is a loss to all of us.

### **Biotech - A Brand New World**

*"In 2001, when we first started tracking the industry, we had about five hundred companies that we could put our hands on, average salary about \$48,600. Let's jump to 2011. Today we are at 4500 companies, average salary \$74,800."<sup>127</sup>*

Biotech is a new world, filled with wonders scarcely imagined twenty years ago. As we delve into the world around us, understanding the genetic makeup of humans and discovering what

holds our world together, products are developed to improve the quality of our lives. Between 2001 and 2010, national employment in biosciences grew by 6.4%, a net increase of 96,000 jobs, even as overall employment in the private sector dropped by 2.9%.<sup>128</sup> As new technology, it should be anyone's game, but early investments have given California and Massachusetts the edge. But there is room for many players.

The biotech industry is the poster child as to what can be accomplished with a little help from the state. Half of the Emerging Technology Fund has gone into life science companies. The Enterprise Fund has provided \$100 million to biotech related projects. An exemption for pharmaceutical biotech clean rooms allowed economic development corporations a great incentive to lure companies to their city. The Cancer Prevention and Research Institute of Texas made Texas a major player. All of these incentives have made Texas a biotech destination to be seriously considered. Texas now ranks number two or number three in the country in terms of producing patents from a life science standpoint.<sup>129</sup>

Today, bioscience in Texas is a \$75 billion industry, providing 236,000 jobs, \$31 billion in payroll. And the industry will continue to grow in Texas, particularly with the federal government's investment in a new biodefense center in College Station.

More information on the biotech industry can be found in the committee's interim charge on CPRIT and the ETF.

### **Aerospace - Changing Frontiers**

*"During the postwar boom years, America's global status was suddenly punctured when the Soviet Union upstaged the United States by launching the first space satellite--Sputnik 1. That the Soviets could pull ahead in the space race stunned most Americans. But in retrospect, it was a boon for the U.S. economy."<sup>130</sup>*

With the close of the space shuttle program, the race for space has entered the private arena. And lots of states are ready to play. The Johnson Space Center is just a building if there is no initiative behind it. We won't be able to encourage private space flight with just a building.

We've been punctured.

There is opportunity for the future. But we have to move fast. And the momentum is beginning to build. Separate initiatives in Texas are addressing the problem, and the governor's office, through its office of Aerospace, Aviation and Space Division, is working to build industry partnerships and keep in Texas the intellectual capital of the 3,000 people laid off by NASA.

Although slightly deflated, the Johnson Space Center continues to employ a large number of people that keep the international space station afloat, including the large amount of ongoing research. Much of that research centers around the logistics involved in maturing technologies that will be needed before long-term space flight can be attempted. And much of that research translates to discoveries that enhance life here on Earth. For instance, without gravity, bone

density decreases. Discovering how to keep astronauts from losing bone mass on a multi-year trip to Mars and back will surely translate into new products for osteoporosis here on this planet.

Although NASA is currently working on research that will hopefully translate into a manned mission to Mars someday, low-earth orbit in the future will be the purview of private space companies. And many of those private companies would like to work with NASA to use their facilities and their expertise. "Space Act Agreements" could prove to be lucrative to JSC and the state of Texas. Over one hundred agreements with private companies thus far to use the facilities and human expertise of NASA will help to keep jobs and research money here.

Additionally, private space launch companies have shown interest in our state. Blue Origin is working near Van Horn on commercial space tourism, XCOR has selected Midland as its base of operations, and SpaceX, which launched goods bound for the space station in May, is currently searching for a launch site in South Texas. Other states want in, though. Florida, Alabama and Virginia have aggressively sought a piece of the privatization pie, and would like to lure our engineers and other technical workers to their states.

But Texas expertise is being recognized where it matters. NASA has announced new agreements with three American commercial companies to design and develop the next generation of U.S. human spaceflight capabilities, enabling a launch of astronauts from U.S. soil in the next five years. Two of the companies obtaining Space Act Agreements and the subsequent monetary grants have Texas ties: SpaceX was granted \$440 million, and the Boeing Company in Houston was granted \$460 million.<sup>131</sup>

Aviation is also part of this cluster, and the aviation industry in Texas currently employs roughly 200,000 employees in over 1600 businesses across the state; including Boeing, Bell Helicopter and Lockheed Martin. These jobs pay an average salary of \$62,000 a year. In addition, Texas is home to two international airlines, and two of the world's largest and busiest airports.<sup>132</sup>

Other future opportunities for the cluster include drone technology. A global rush is on to build drone arsenals, and may push global spending on drones to \$94 billion--double its current level. More than 50 countries have bought drone technology recently; China has been particularly diligent. The future of drones could include non-military applications; imagine drones giving police officers a birds-eye view of large crowds, or sending your own personal drone up on the roof to see what's going on with your satellite dish.

### **Computer Technology - More than a Laptop**

*"By 2014, three billion people will be connected, either by the internet or through mobile devices."<sup>133</sup>*

Almost any information on the future of computer technology is out of date as soon as it is in print. In 2008, the Governor's Competitiveness Council found that Houston, Dallas-Fort Worth and Austin had strong positions in wireless and supercomputing sub-sectors, although all Texas cities competed well in digital media. At the time, Texas had approximately 69,000 employees in this cluster, representing ten percent of the U.S. workforce.<sup>134</sup>

But the industry continues to morph in new directions. Searching, storage and security will open up new opportunities.

By the year 2020, the amount of digital information created and replicated in the world will grow to an almost inconceivable 35 trillion gigabytes as all major forms of media -- voice, TV, radio, print --complete the journey from analog to digital.

Soon, everyone will know what a zettabyte is. For those of us still grasping with technology, a zettabyte is a million petabytes. A petabyte is a million gigabytes. The digital universe will be 44 times larger than it was in 2009. The amount of spam in your inbox will also increase exponentially.<sup>135</sup>

The new opportunities for computer technology will be in managing, storing and protecting all of this new data. New search tools will be needed to sift through the tsunami. Managing the folders of volumes of information that need to be at our fingertips will be a challenge. Protecting sensitive data will be ongoing. Hackers attack our country thousands of times a week. Fending them off will open the door for new products and job opportunities.

But other states and nations are very interested in these opportunities, also. Oklahoma and Louisiana offer employers that create jobs in IT and research and development cash rebates of 5% of taxable wages for up to ten years. China has offered Dell the free use of a building for five years, a holiday from corporate taxes for several years, subsidized worker housing and an income tax break for the workers.<sup>136</sup>

Texas can be competitive in this area by continuing to stress STEM education for future workers, and by reinstating the sales tax break for purchase of equipment for research and development. Texas also has an advantage with cheap land and reliable, cost-affordable energy for data centers, and could cement that edge with incentives targeted in that area.

### **Petroleum and Chemical - New Possibilities**

*"We are currently the second largest export in the state, we've been trading off and on for the past few years with computers and electronics. And we're not too upset about that, to be second to them, because a lot of that stuff has our materials in it."<sup>137</sup>*

Texas has the largest conglomeration of petrochemical businesses in the nation, maintaining a workforce of more than 460,000 employees in 2008. But a unique set of circumstances could cause that number to boom.

Natural gas is the number one ingredient used by the chemical industry, and thanks to shale gas, has suddenly become very cheap. For the first time in decades, the industry is expecting to expand. Dow Chemical is planning to build an ethylene plant in Freeport that will create 150 jobs as part of a \$4 billion investment in expanded chemical production.<sup>138</sup> The ethylene plant, along with an expanded herbicide and propylene plant, will, in turn, feed companies with enough new products to support 35,000 jobs. Dow is leading the way--Chevron Phillips Chemical, Sasol

Ltd., Formosa Plastics and Royal Dutch Shell also plan to build U.S. ethylene plants during the next four years. All because the increased gas output from shale deposits has made U.S. production the cheapest outside of the Middle East.

### **Energy - Not Just Oil and Gas Anymore...**

The Texas energy cluster employs more than 140,000 people, which is 70 percent of the total U.S. energy workforce. The state leads the nation in overall electricity production and installed wind capacity, and its competitive wholesale power market is among the most demand responsive in the country.<sup>139</sup> This cluster's reliability is one of Texas' major strengths when it comes to luring new businesses.

Prior to 1999, the state would tell the utility company what type of power plants to build, and in return the utility would be guaranteed a specific return through rates for the next forty years. Immediately after the deregulation of the market, a boom was created in the investment of new power plants.

But that was then. We have reached the point where the state needs additional plants for the continuing growth of Texas' population, but the rate of return is no longer guaranteed. This has resulted in a market that may not have enough power for Texas' hottest days. If a day is mild, power plants will generate enough electricity to supply the state. But when days are extremely hot, all power plants together cannot generate enough power to cool down the population. Building a power plant that may or may not be generating on any given day, and thus may or may not be making money, is not a decision that any sane business person would make. At the current time, energy cannot be stored for later use. It is generated and used immediately.

The future of the industry continues to evolve, as new energy sources become more affordable, and the technology to store those sources becomes more possible.

### **...But Oil and Gas are Still Faithful!**

*"A westward shift in energy development is on, with North America emerging as the lead player. In 2011, the United States became a net exporter of petroleum products for the first time in 62 years."<sup>140</sup>*

Show some respect for the elderly. Oil and gas carried our economy for many years. Now it could change the world. And Texas can lead the way.

Due to new technologies such as fracking, estimated of North American's energy reserves have skyrocketed. By 2020, these new sources will represent an estimated two-thirds of oil and gas production. By then, according to the consultancy PFC Energy, the United States will surpass Russia and Saudi Arabia as the world's leading oil and gas producer.<sup>141</sup> In case you missed the relevance of the last statement, here it is again: **we will surpass Russia and Saudi Arabia.** Imagine what that could mean to the world. No more making nice with countries we don't particularly like.

Oil and gas employment in Texas is now at the highest level of the century, adding 33,500 jobs during the last twelve months. At the time of this report, 297,440 employees were on the oil and gas industry payroll.<sup>142</sup> That number continues to grow with the Eagle Ford Shale region, spanning 24 counties in South Texas, leading the way with hydraulic fracturing. Employment and wages have grown sharply in this mostly rural area in the past few years.<sup>143</sup>

The almost \$34 billion earned by those employees does not include the number of families in Texas receiving royalties -- 570,000 families earning nearly \$11 billion in 2010.<sup>144</sup>

### **Other Major Economic Contributors - Agriculture**

*"Unlike most high-income nations, the United States remains extraordinarily resource-rich; its ability, for example, to feed both itself and the world remains one of its critical competitive advantages."<sup>145</sup>*

Agriculture is a major contributor to the Texas and American economy. And our country's trade deficit with other countries doesn't include agriculture, which currently enjoys a trade surplus of approximately \$34 billion. The International Food Policy Research Institute (IFPRI) reports foreign investors sought or secured between 37 million and 49 million acres of farmland in the developing world between 2006 and mid-2009. Investors are also investing heavily in U.S. cropland.

Texas is the second largest agricultural producer in the nation, and we export a lot of what we grow, making our state a reliable trade partner. By 2050, 9.2 billion people worldwide will need feeding. And the fastest-growing countries are the least able to support their existing populations. To meet human nutritional needs over the next 40 years, global agriculture will have to supply as much food as it has produced during all of human history.<sup>146</sup>

In the meantime, farmers who have provided in other countries are facing water shortages, as their cities continue to grow at a fast rate. Saudi Arabia will phase out wheat production by 2016, due to depletion of its major aquifer.<sup>147</sup> Fish are being taken from the ocean faster than they can reproduce. The melting ice sheets threaten rice-growing river deltas in Asia. China lacks the water and land resources to feed its people, and accounts for the consumption of 60% of the world's soybean exports and 40% of its cotton. Texas has a rich agricultural history, and can play a big part in feeding the world.

Texas currently leads the nation in the production of cattle, cotton, horses, sheep, goats, hay, wool and mohair, and is in the top ten for a range of other commodities, including corn, wheat, eggs, peanuts, honey and rice. The agriculture industry employs 1 out of every 7 working Texans, and ranks third in the United States in agricultural exports with a value of \$6 billion in 2010.<sup>148</sup> Agriculture's impact on the Texas economy is \$100 billion annually.

Agriculture is changing, becoming a high tech industry. The days of plowing, seeding, irrigating and praying are over. Or rather, the praying is supplemented by advances our forefathers never envisioned. Now computerized mapping technologies allow farmers to take pictures of their land from space. A software application allows them to see where yield was down and direct

more fertilizer to that area to increase the output next year. American farms have used technology to improve their productivity for years. Agricultural research and development must be a priority for Texas.

Another facet of agriculture that is developing rapidly is agritourism. Agritourism businesses include farm tours, self-harvesting of produce, hay rides, corn mazes, and Christmas tree farms. Nationally, income per farm from agritourism has more than doubled since 2002.

### **Tourism and Texas Hospitality**

*"The more reasons we give people to come to Texas and enjoy our cities, the more money our restaurants, our hotels, our museums and our local economy get as a result of that."<sup>49</sup>*

Texas continues to add new residents daily. Those who can't move here do the next best thing--visit, and leave their tourist dollars behind. Texas is the third most popular travel destination as a state in the United States. Travelers to and within the state spent approximately \$60 billion last year, providing jobs for half a million Texans.

In conjunction with tourism are arts and culture. Texas artists have transformed small towns; opening stores, purchasing supplies, and volunteering their time to teach in local schools. Their impact is also felt in large cities where the intangible "quality of life" results in museums, aquariums, and arts districts. Such institutions attract not only tourists, but also businesses that prize "quality of life," and whose employees want to be in an area that provides them.

An innovative and creative workforce needs an environment that encourages thinking skills now demanded by businesses. The "liveability" of a community is necessary to attract, nurture, and retain the best and brightest.

Although not officially a cluster, "quality of life" should never be discounted as an economic driver for the state.

### **Cluster Challenges**

When determining what clusters should be a part of a state's economy, the challenge is to find the clusters that exist, not the ones we wish we had. Examining our core strengths critically has led to our current cluster groupings. And for those clusters that exist, regional differences mean that strategies cannot be one-size-fits-all. Connections should be made to determine regional needs.

Once established, cluster policies tend to emanate from the top-down. As a result, strategies are put in place without the connection to industry and civic leaders who know the practical needs of the cluster. Cluster committees are needed to generate suggestions and make recommendations to the top. Committees should include a wide range of people, including those who actually work in the cluster.



One of the jobs of the governor's office is to identify gaps in clusters, and make efforts to fill them. The governor's office has done a good job of identifying and filling gaps, but not a great job of advertising their successes. For instance, how many people were aware that the funds and effort expended to lure the Biosecurity Center to College Station was actually filling a manufacturing hole that existed in our biotechnology cluster? The governor's office has endured a lot of misinformation about the Emerging Technology Fund. Education as to what is actually happening is crucial. Cluster committees could help with that effort.

### **Out-Dated Traditional Thinking**

As the economy continues to transform and morph, one thing that must be taken into account is velocity. How quickly does our nation and state react to change? The answer: not very.

Americans are at the forefront of wanting the latest (fill in the blank). Yet we cannot quickly produce the goods we crave. When Apple needed a new screen, China woke up 800 workers in a dormitory and had them cranked out in a matter of hours. Although most American workers would prefer not to live in a dormitory, the dormitory itself represents problem-solving thinking. That kind of thinking is hard to find these days.

This loss of flexibility begins early, in a state whose education foundation consists of "teaching to the test." The culture of trying to find the one right answer in a school test where the wrong answer means failure has moved into the workplace, as employees know there will be repercussions if you "think outside the box" and the results of that creative thinking do not lead to quick profits.

We have become a nation of non-risk-takers, which is the knife in the heart of innovation. Clusters need constant innovation to survive.

### **Recommendations**

The governor's office of Aerospace, Aviation and Defense has done well with its limited resources, but a statewide initiative to address the future position of Texas as a "space state" is needed. That will mean economic development incentives and tax breaks. Florida and Virginia already have done a lot of groundwork in this area, and Texas needs to show it is serious about attracting and keeping the private space industry.

The clusters need a point-man to avoid missed opportunities. For instance, oil companies are digging deeper into the Gulf of Mexico. The Johnson Space Center has the largest pool in the world, and can replicate deep-sea conditions for researchers. A point of contact could make the connection, bringing the energy and aerospace clusters together for mutual benefit.

In the same vein, the state should catalog its assets. Knowing that there is a wind tunnel in College Station and having it written down somewhere for others to know could result in more fruitful endeavors.

Just as the regional centers of innovation and commercialization (RCICs) serve so ably for the Emerging Technology Fund, individual clusters should also have a panel of experts to continually monitor the needs of the cluster. Rather than a lobby of industry groups, which are useful in their own way, the clusters should have a wide range of experts; including industry, science, grant writers, entrepreneurs and local economic developers.

Texas should consider its inventory tax. Although only about 3%, the tax is a game changer when it applies to a \$350 million aircraft built in this state. Capping the top end of the tax might encourage aircraft building to remain in this state.

Texas should add agriculture to its list of cluster industries. Sustained research into getting the most out of crops will lead to additional exports, and thus additional revenues.

Texas should maintain the portion of the hotel-motel tax for the benefit of tourism marketing. The \$30 million dollar investment generates about \$3.7 billion in tourism spending, returning \$190 million back to state coffers--nearly a seven-to-one return on investment.

## The Importance of Manufacturing

## Why We Need to Make Our Own Stuff: Manufacturing in Texas

*"It is now proper to proceed a step further, and to enumerate the principal circumstances, from which it may be inferred, that manufacturing establishments not only occasion a positive augmentation of the produce and revenue of the society, but that they contribute essentially to rendering them greater than they could possibly be, without such establishments." - Alexander Hamilton, Report on the Subject of Manufactures, December 5, 1791.*

When Alexander Hamilton wrote his "Report on the Subject of Manufactures" in 1791, the leadership of a very young United States realized that supplying themselves with needed goods was vital to shoring up their newly-won independence. Over 200 years later, we seem to have forgotten that lesson, as we increasingly import our goods from other countries, and send those jobs back overseas.

Attitude plays a part. Most of us have never had the opportunity of actually being on the floor of a manufacturing plant. We rely instead on old newsreels depicting an automobile slowly making its way down an assembly line, attended to by scores of individuals, each with a small part to play. And in Texas, a right-to-work state, that image evoked memories of unions, and striking workers who had no formal education. Manufacturing was seen as a bleak, boring occupation, something done primarily "up north." A recent public opinion survey on manufacturing found that among 18-24 year-olds, manufacturing ranked dead last among industries in which they would choose to start their careers.<sup>150</sup>

And in this new "knowledge economy," what does it matter if we end up using other countries to do that manual labor?

It matters. It matters a lot.

### Jobs on the Move

There are different types of manufacturing. Labor intensive jobs that require no special training are the ones that have been largely outsourced to other countries. It's not an illusion--jobs disappeared. As long as other countries can offer cheap labor, labor intensive jobs that require no special training will be lost. We can't compete with cheap labor. At least not right now. But things could be changing.

Remember when things were made in Taiwan and Japan? Now China is the place to make things. But with increasing prosperity, Chinese workers want more pay, more benefits, and shorter hours. A number of firms are now using labor in Bangladesh, Cambodia and Vietnam. And when those workers want more? Myanmar could be next. Eventually, we'll run out of world. And those jobs could be coming home.<sup>151</sup>

Sometimes, however, the jobs didn't even disappear to another country. Sometimes, many times, they were lost to change. Analyst David Rothkopf calls it "being outsourced to the past."<sup>152</sup> That change occurred in the same way that computers replaced manual typewriters and carbons in the office setting. And that change is advanced manufacturing. The move towards advanced

manufacturing was already in the works prior to the most recent recession. But the recession accelerated the process, as plant managers tried to do more with less.

### **Advanced Manufacturing**

*The U.S. still far surpasses China in productivity, with 11.5 million American factory workers producing roughly the same value of goods as 100 million Chinese workers. Because of the high level of American productivity--the result of well-trained workers leveraging more and more advanced machines, robots, and software--the value created by the average American worker is much greater than that created by an average Chinese worker, which means that an American worker can still earn far more than a Chinese worker.*<sup>153</sup>

Advanced manufacturing is defined as a family of activities that (a) depend on the use and coordination of information, automation, computation, software, sensing, and networking, and/or (b) make use of cutting edge materials and emerging capabilities enabled by the physical and biological sciences, for example nanotechnology, chemistry, and biology. This involves both new ways to manufacture existing products, and especially the manufacture of new products emerging from new advanced technologies.<sup>154</sup> In other words, you've got to be smarter. But there are rewards for being smarter.

Today's manufacturing plant floor requires a skilled worker with at least an associate's degree to oversee it, and the pay reflects those skills. In 2009, the average manufacturing worker earned \$74,447 in annual pay and benefits compared with \$63,122 for the average non-manufacturing worker.<sup>155</sup> In addition, manufacturing employers tend to compensate workers better for paid leave, supplemental pay, and insurance than in the general economy.

Those factors are starting to attract the attention of those who previously wouldn't have considered manufacturing as a career. Between 2000 and 2008, the share of the total manufacturing workforce with B.A. degrees increased from 16 percent to nearly 19 percent, and the share with graduate and professional degrees increased from 5.7 percent to nearly 8 percent. The share of manufacturing employees with less than a high school diploma fell from 14 percent to just under 12 percent during the same time period.<sup>156</sup>

### **Manufacturing Matters**

*"A rebound in manufacturing has important ramifications for the U.S. economy. Sixty percent of exports relates to manufacturing, 90 percent of patents and 70 percent of private-sector research and development."*<sup>157</sup>

*"Manufacturing is a primary wealth generator."*<sup>158</sup>

But on a larger scale, manufacturing is important to all of us. Manufacturing in just five states, of which one is Texas, adds over half a trillion dollars to the national economy. Texas manufacturing generates \$159 billion to the state economy.<sup>159</sup> Manufacturing also has a large "multiplier" effect; meaning that every manufacturing job creates a certain number of other jobs. It is estimated that every manufacturing job in the United States creates six more private sector

jobs. And middle-skill jobs, those that require a high school education, but not a four-year degree, currently make up the largest segment of jobs in the U.S. economy, and will for years to come. In 2009, about 51 percent of Texas' jobs were in middle-skill occupations. But it is likely that only forty percent of the state's workers have the appropriate training for these jobs.<sup>160</sup>

With that kind of impact, we should be encouraging more manufacturing, doing all that we can to locate plants here. When manufacturing generates revenue to our economy, that is money that individual Texans do not have to pay. Other states have a personal income tax. We use state revenue, also called "incentives," to lure businesses who will pay taxes for us. It's as simple as that.

### **Birthplace of Ideas**

But it's more than just encouraging the jobs that come with advanced manufacturing. Those jobs spur a quality that is desperately needed in our new economy--innovation.

Many times, innovation is born in the manufacturing plant. That innovation comes from the knowledge and expertise of people largely in the manufacturing sector, as those companies tend to hire bright minds. The 2010 Global Manufacturing Competitiveness Index, based on a survey of manufacturing executives worldwide, states that the primary competitiveness factor is talent-driven innovation. Talent-driven innovation comprises both the quality and availability of a country's brain trust.<sup>161</sup> It's probably not a coincidence that this country's brain trust has been diluted as manufacturing moves to other shores.

There is also evidence that we are losing leadership in manufacturing industries based on inventions and knowledge that originated in the United States. Foreign firms now manufacture many products invented here. For example, the United States no longer has the knowledge, skilled people, and supplier infrastructure required to produce light-emitting diodes for energy-efficient illumination, components for consumer electronic products like the Kindle e-reader, or advanced displays for TVs, computers, and handheld devices such as mobile phones.<sup>162</sup> Upgrades to these devices will definitely be discovered, and thus manufactured, somewhere else.

### **Innovation at Work**

Although manufacturing is only about 11 percent of gross domestic product, it employs the majority of the nation's scientists and engineers, and it accounts for 68 percent of business R&D spending, which in turn accounts for about 70 percent of total R&D spending. A strong manufacturing sector supports the key building blocks of the nation's innovation ecosystem--its skilled scientific, engineering and technical work force, its research and development, its ability to identify technical challenges and provide creative solutions.<sup>163</sup>

It's important, too, for manufacturing to respond quickly to market changes. When Chesapeake Bay Candle opened a highly automated factory in Maryland, it was responding to high shipping charges and rising labor costs in China. But the company also found that having a research and development facility in the American factory allowed them to respond to new trends much faster.<sup>164</sup>

## **Lost Incentive in Texas**

*"Companies will make a decision on where to make their R&D investments based on where their R&D dollars can get the greatest impact. They will move to states where the impact is the greatest."<sup>165</sup>*

When Texas dropped its research and development tax credit during reform of the franchise tax, we lost a manufacturing incentive.

Those who lament the lost tax credit argue that its loss seriously affects Texas due to the industries located here. Electronics, aircraft, chemical and refining, and drilling industries all have benefitted in the past from significant research and development.<sup>166</sup> According to a comptroller's report for the time period of 2001 to 2006, 823 firms in Texas made approximately \$18.3 billion in qualifying R&D expenditures, reducing their taxes by a little over \$16 million a year. During the period the credit was in effect, the three sectors most involved in outside research (manufacturing, scientific and technical services, and information services) showed growth in employment that was between 2.1 to 4.6 times faster than the growth in employment in the state as a whole. In the years since the credit was repealed, the same sectors show employment declines that are between 1.5 to 1.7 times the decline in the state as a whole.<sup>167</sup>

But it's not just financial loss. It's loss of faith. Research and development takes years to come to fruition. When Texas eliminated the research and development credit against the franchise tax, the \$18.3 billion in investments had resulted in \$450 million of credits. When governments give and take R&D credits, companies are unable to plan for the future. It is difficult and frustrating to try to plan long-term projects when there is no guarantee the credit will still be in place next year. Consistent government support and policies are important.

## **Business is Picking Up**

In April of 2012, manufacturing in the United States grew at the fastest pace in ten months. Large manufacturers such as Boeing, Caterpillar and Goodrich added thousands of employees last year, and they are boosting capacity to handle a backlog of orders. This surge of business is stimulating smaller suppliers, too, as they are guaranteed a certain level of orders to the larger manufacturers.<sup>168</sup>

And this includes manufacturers who are returning to America. Farouk Shami, founder and chairman of Farouk Systems, which manufactures beauty products, moved his manufacturing operations from China to the United States over the past few years. Although costs increased 15% after the move, Shami says the move resulted in a better-quality product, which resulted in fewer returns. And he no longer has three months of inventory sitting on the shelves. The facility currently employs 2,000 in the Houston area.<sup>169</sup>

However, finding the workers to fill the positions created by the upswing won't be easy.

## Desperately Seeking Skills

*"There is, in the genius of the people of this country, a peculiar aptitude for mechanic improvements...it operate(s) as a forcible reason for giving opportunities to the exercise of that species of talent, by the propagation of manufactures."*<sup>170</sup>

*"The (skills gap) problem is especially acute in the manufacturing sector...an industry that increasingly needs workers with a wide array of education and training, everything from technical certificates to advanced degrees."*<sup>171</sup>

*"27% of people with post-secondary licenses or certificates--credentials short of an associate's degree--earn more than the average bachelor's degree recipient."*<sup>172</sup>

Manufacturers are struggling.

Deloitte and the Manufacturing Institute teamed up to determine the level of talent in the manufacturing industry. Their survey of manufacturing firms led to some startling truths:<sup>173</sup>

- Even during the recession, 5% of jobs remained unfilled, simply because the right people with the right skills couldn't be found.
- The number one skills deficiency among current employees is lack of problem solving skills.
- Eighty percent of those responding to the survey indicated that machinists, operators, craft workers, distributors, and technician positions will be hardest hit by retirements in the upcoming years. At the same time, the companies expect these jobs to be the hardest to fill.

Houston's manufacturing sector is busy with providing pipes, valves and drilling equipment for the fracking boom. Houston workers are putting in over 49 hours a week on average, up from 42 hours a week in 2007. Additional workers are desperately needed. Community colleges are offering fast-tracking programs to get the skills out as quickly as possible.<sup>174</sup>

The Texas Workforce Commission has ably, temporarily filled the gap with their use of the Skills Development Fund. The TWC works through a collaboration among businesses, community and technical colleges, local workforce development boards and economic development partners. A business or trade union identifies a need, and then partners with a technical or community college to provide training. All parties work together to develop curricula and conduct training. The Skills Development Fund pays for the training.

During the 2010 fiscal year, the TWC awarded 49 grants, serving over 200 businesses. Those grants supported the creation of 5,736 new jobs and upgraded the skills of nearly 21,000 workers in existing jobs.



The Texas State Technical College, a two-year technical college system, works to provide for the industrial and technological manpower needs of the state. The welding and automotive programs are among the most popular offerings. The mechanical engineering program, however, has not attracted the same enthusiasm. This program trains machinists who can design, operate and troubleshoot the computer-controlled machines used in factories.<sup>175</sup>

But training needs to start earlier. It needs to start with public education.

### **What Happened to Vocational Education?**

*"Everybody has to be a lawyer, nobody wants to make things."<sup>176</sup>*

*"Our programs are under attack...districts are eliminating them at an alarming rate because of the funding issues in the state through our education system. When you have to hire more academic teachers to make a 4x4 (college prep program) work, and you have limited funds, somebody has to go. And the electives teacher is the one who gets the ax."<sup>177</sup>*

You have to be advanced in years to remember that "auto shop" used to be a course in high school. In the olden days, students could learn welding techniques, lathe operation, and how to operate milling and grinding machines. Those days are gone. Somewhere in the 1990's it was determined that knowledge jobs were going to be the next big thing. And computers were the necessary equipment. The metal lathes, milling machines and table saws that once resided in schools are now available on E-Bay.

People stopped tinkering with stuff. Small appliances that you could open up with a screwdriver and peek at the innards became electronics that could not be opened up with any normal, available tool.<sup>178</sup> Many people do not remember that Sears once included the schematics of all appliances sold in their catalog. It was assumed that consumers would want to be able to refer to them as they performed their own repairs.

We now have a shortage of smart people who know how things work. Although their exodus from the workplace was blunted by the recession, the people who possess hands-on intelligence are now retiring. Sixty percent of manufacturing employees in Texas will be eligible to retire by 2015. There are no replacements.

According to Mitch Free, CEO of MFG.com, an online directory that matches businesses with domestic manufacturers, every factory needs a machinist to operate it, whether it's to operate machines or to create machine parts. And machinists also create molds and casings to make plastic parts that are used in everyday products, such as computers and cell phones. But as manufacturing is making a comeback, the talent isn't.<sup>179</sup> Those jobs typically require about a year in trade school, plus a few years of apprenticeship. The reward is an average pay of \$60,000 a year.

But in spite of this, there is no encouragement to enter the vocational world. There are three diplomas offered in high school, "distinguished," "recommended," and "minimal." Guess which one is offered to those students who are not college bound?

On a national scorecard of how each state ranks among its peers in manufacturing preparedness, Texas' score was a "C." Although we scored well in categories such as productivity and innovation and worker benefit costs, what really dragged us down was the "D" we scored on human capital, a measure of education and skill level.<sup>180</sup>

## **Rethinking College**

Parents, too, want their children to go to a four-year university, despite the fact that such a path might not be in anyone's best interests. About half of the students who attend Texas' public colleges fail to graduate in six years. Among high school students who graduated at the bottom forty percent of their classes and whose first institutions (they had attended after high school) were four year-colleges, two-thirds had not earned diplomas eight and a half years later.<sup>181</sup> Although it is admirable to want to be the kind of state and nation that foresees college for all, it is also ironic that we are limiting the choices of students who have always been told they can be whatever they want to be in this country. College as the only choice is no choice at all.

And those who do graduate often find that their courses of study are mismatched with the needs of the economy, leading to extended joblessness. And failing to get a good start could mean falling behind forever. A study tracking young Danish workers who were jobless for at least ten months in 1994 discovered that 15 years later, they were almost twice as likely to be unemployed and earned about \$10,000 less per year than those who were employed as young adults.<sup>182</sup>

## **Community Colleges**

Community colleges would seem uniquely qualified to offer vocational training, but many students find themselves in remedial classes from which they never emerge, and are completely separated from the classes that could provide relevant occupational training. As a result, most students never earn even an occupational certificate, much less an associate's degree.<sup>183</sup>

Many community colleges, however, have embraced their role. Austin Community College's Round Rock campus invited students to an open house to explore the fields of automotive and welding technology. Over 600 students took part in the event this year, a huge increase from the 250 who attended last year. The interest is definitely there.<sup>184</sup>

Other great examples of community college collaborations include Amarillo College and Bell Helicopter Textron Inc., who have worked together to train hundreds of workers for Bell's military aircraft assembly center in Amarillo. The Laredo Community College worked with Conoco-Phillips to develop a training program for oil lease operators. San Antonio has three individual Alamo Academies to address aerospace, information technology and security, and manufacturing technology.<sup>185</sup>

Other states have realized that interested students should be engaged during their high school years, not after. The Wisconsin Youth Apprenticeship Program began in the early 90's and has since matured into the nation's largest apprenticeship opportunity for high school students. Under the two-year program, high school juniors and seniors complete up to 900 hours of work-

based learning and related courses. Many also earn college credits. Apprenticeships, available in nearly half of Wisconsin's school districts, are now offered in fields such as healthcare and manufacturing. Over 75 percent of youth apprenticeship graduates enroll in a technical college or university, and over 60 percent complete their degrees, which is far higher than the national average. In addition, over 85 percent of graduates are employed after leaving high school, and 98 percent of participating employers say they would recommend the program to others.<sup>186</sup>

Individual regions in Texas are working on their own to provide skilled labor. Local industry owners and contractors developed the Craft Training Center of the Coastal Bend in Corpus Christi in 1987. The non-profit training Center houses electrical, instrumentation and welding laboratories to train individuals (including high school students) to become entry level craftsmen. Students are fully accredited and certified, and are often approached by employers before they graduate.

The students who talked with committee members visiting their school had concrete plans for what they wanted to do with their future. When was the last time you talked with a 17-year-old who had a serious plan?

### **Why Do Students Drop Out?**

*"We have so many students who don't see where they fit in school because they are not going to college. We must stop saying not everyone can go to college...not everyone should go to college. These are different intelligences, not lesser. We must address them, we must serve them. And we must equip them. Texas needs them."<sup>187</sup>*

Students drop out for many reasons, but the most cited reason is that classes are not interesting, not relevant, or teach subjects that "you're never going to use in real life." Eighty-one percent of surveyed dropouts believe that opportunities for real-world learning, such as internships or service learning, would have made school more relevant to them, and thus improved their chances of staying in school.<sup>188</sup>

Over their working lives, the average high school dropout will have a negative net fiscal contribution of nearly -\$5,200 while the average high school graduate generates a positive lifetime net fiscal contribution of \$287,000. The average high school dropout will cost taxpayers over \$292,000 in lost tax revenues, higher cash and in-kind transfer costs, and imposed incarceration costs relative to an average high school graduate.<sup>189</sup>

For Texas students who do not want to go to college, there is no reason to stick around for years of social studies and English. Students at the Craft Center in Corpus Christi spoke about how boring and irrelevant they found their classes, and seemed to regard their work at the Center as their reward for sticking it out in regular school. Most students reported that the working environment helped them understand their regular classes better, resulting in improved grades. One teacher at the Craft Center remarked that many of his students didn't understand or see the point in fractions, until they held a tape measure in their hands.

## Politically Correct

No one wants to discuss it. But it is on everyone's mind. And that is the belief that career and technical training is, in some way, inferior education. That belief has pushed the agenda that everyone should go to college, and has ignored the fact that we all learn differently. And learning is learning--there is no such thing as "superior learning."

This report is not about deciding the future of our students. This report is about giving students options to decide their own future.

The Pharr-San Juan-Alamo Independent School District is one of the nation's most impoverished, and 99 percent of the students are Hispanic. The district is creating a portfolio of options that will soon enable all students to graduate from high school with at least twelve college credits and the skills to progress to a degree or credential. Some will graduate high school with an Associate's degree, ready to specialize in a career path at a four-year college. Some will earn industry-recognized technical certificates that will help them get jobs to work their way through college and advance their careers. None are discouraged from achieving all that they can.

The progress made by the district is remarkable. In 2007, only a third of students with limited English proficiency graduated in four years. By 2010, the four-year graduation rate for limited English proficiency students was 72 percent, well exceeding state and regional averages.<sup>190</sup> Students have taken control of their destiny with rigorous standards, and well-defined options.

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Providing productive employment to those who desire it is one of the best reasons to encourage manufacturing in this country, and in this state. But it's not the only reason. It could actually be a matter of national security.

## National Concerns

*"...the United States are to a certain extent in the situation of a country precluded from foreign Commerce. They can indeed, without difficulty obtain from abroad the manufactured supplies, of which they are in want; but they experience numerous and very injurious impediments to the emission and vent of their own commodities."<sup>191</sup>*

Why does a trade deficit matter? Basically, if we are not buying from our own manufacturers, we are idling our plants and laying off workers. Plus, when we import more than we export, we are sending more of our capital out of our country. We are using our money to make another national wealthier. Most of us have a competitiveness in our nature to not be thrilled with that fact.

The United States needs to work on its lopsided trade deficit. Currently, we import more goods than we export. And while that is good in the short term, allowing consumers to purchase

cheaper goods, it hurts our country in the long term, as wealth leaves the country for another country's coffers. This includes high-tech wealth. In the late 1990's the United States' share of high-tech exports was as high as 22 percent. By 2010, it had shrunk to 15%. During the same period, China's high-tech exports quadrupled from six percent in 1995 to 22 percent in 2010.<sup>192</sup>

## **Mischief Abroad**

*"The extreme embarrassments of the United States during the late War, from an incapacity of supplying themselves, are still matter of keen recollection: A future war might be expected again to exemplify the mischiefs and dangers of a situation, to which that incapacity is still in too great a degree applicable, unless changed by timely and vigorous exertion."<sup>193</sup>*

At the same time, it is foolhardy to become dependent on a foreign industrial base for items that are critical to the United States. A 2006 National Research Council study commissioned by the Defense Intelligence Agency cites information technology, nanotechnology and biotechnology as "areas worthy of continued vigilance against the possibility of strategic denial." At the time of this report, the United States, the European Union and Japan had filed a trade case over China's export restrictions on rare earths, of which 97 percent are produced by China. The United States relies heavily on rare earths, materials that eventually become components of the United States' defense systems. For instance, a coating of yttrium, which can withstand huge amounts of heat, is found inside jet exhaust systems. And samarium, which is resistant to radiation that would come from a nuclear or magnetic field attack, is key to magnets that go into missiles and other weapons.<sup>194</sup>

Building up our own technology and manufacturing leaves us less susceptible to another country's strategic denial.

Protecting our innovations from theft is another reason to bring manufacturing plants back to the states. American companies are currently required by the Chinese government to locate their plants in China if they wish to sell to China's growing markets. But in order to locate factories in China, American companies are required to share their technology with Chinese competitors.<sup>195</sup>

A company in Aurora, Illinois turned to China after not being able to find an American firm to supply extrusions and castings at the right price for their metal brackets and television stands. Sales soared as flat-screen televisions needing such mountings took over the market. But then the company began to see copies of its products turning up all over the world. That realization brought the production back to America.<sup>196</sup>

## **Recommendations**

Opportunities for work-linked learning need to be made more widely available. Vocational education must become an option again.

High school students must be given information, including guidance based on local or state labor market data, to help them make informed decisions about future careers. Community colleges are often attended by those over age 25 who have entered the labor market and then become

unemployed, thus discovering career information the hard way. Students must not be left to flounder on their own. In an ideal world, schools would employ career counselors (separate from psychological counseling) to provide one-on-one attention.

The legislature should consider reinstatement of the research and development tax credit to qualified manufacturers.

# Incentives

## The Arms Race: Incentives

*"The art of war is of vital importance to the state."<sup>197</sup>*

*"And while the sun and moon endure,  
Luck's a chance, but trouble's sure,  
I'd face it as a wise man would,  
And train for ill and not for good."<sup>198</sup>*

You're not being paranoid. They really are out to get us. And we're helping them do it.

The U.S. corporate tax rate is 35%. When combined with the average state rate, it rises to 39.2%, the highest in the world. This may not have mattered fifty or sixty years ago, when our country was the only place to get the high-quality goods that others wanted. But the world has changed, and the tax rate is only one of the things that puts the United States at a disadvantage globally. It has been up to the states and local governments to have policies and economic development tools that help mitigate the uncompetitive federal rate.<sup>199</sup>

Other states are in an arms race with Texas. They want our businesses, and they will do whatever it takes to get them. That includes incentives. Incredible incentives, crazy incentives.

We've built a beautiful gingerbread house with our incentives, and we've lured them in. But other states are working to make their gingerbread houses more alluring.

Virginia has just passed legislation to make their state more attractive to data centers by expanding the sales and use tax exemption for the purchase or lease of computer equipment or enabling software. Wyoming offers a data-center sales-tax exemption. Utah has created an international trade hub that helps companies assess their export potential and then connect them with partners to help them achieve that potential.

Arizona is enhancing their state's existing R&D tax credit by 10% if increased R&D is conducted with an Arizona university. Maryland offers a biotechnology tax credit of up to 50% for qualified investments in Maryland-based companies, and a research and development tax credit. Georgia has eliminated taxes on energy for manufacturing. Louisiana is offering a tax credit for private-sector investment in port facilities. Many states are prioritizing entrepreneurial growth, skills training, and streamlining of the permitting process.

Rick Scott, the new governor of Florida, has stated, "We are going to learn what Texas and New Jersey have done, and in Florida, we are going to do it better." In other words, "we're gunning for you."

We can't even depend on the boom in natural gas production in the Eagle Ford Shale. Other states, such as Ohio, also have large natural gas deposits. Texas energy firms have taken notice, and are beginning to move their drilling rigs, taking oil field services and pipeline infrastructure outfits with them.<sup>200</sup>



## **The Arsenal - Mortars, the Heavy Hitters**

*"...the challenge facing every developed country in the twenty-first century is to become an idea factory, which includes both generating ideas at home and taking advantage of ideas generated elsewhere."<sup>201</sup>*

## **The Enterprise Fund**

Created in 2003 by the 78th Texas Legislature, the Texas Enterprise Fund is the largest deal-closing fund in the United States, and allows the state to respond quickly and aggressively to bring jobs and employers to Texas. Projects considered must demonstrate a consequential rate of return on the public dollars being invested. Capital investment and projected new job creation must be significant. Competition with another state for the project must exist, and the business must not have already announced a location.

Funding for individual projects is not arbitrary. Job calculation and the effect on the economy are all worked up according to a strict formula to come up with an assistance package. The calculation takes into account the number of jobs created, and the resulting salaries; which must be the average county wage. It is then determined how long it will take for the additional spending of those new jobs to result in payback to the state's investment in the form of sales taxes. There is no haggling with the Enterprise Fund. The amount offered is final.

## **The Emerging Technology Fund and CPRIT**

*In 2009 United States consumers spent significantly more on potato chips than the government devoted to energy research and development--\$7.1 billion versus \$5.1 billion.<sup>202</sup>*

It really is up to us to improve our innovation and create businesses.

Already covered in previous chapters, these programs bring biotechnology and technological start-ups to the state, both necessary to grow an economy. Should we get rid of these funds? Consider this: More than half of the states maintain state-supported pre-seed funds, while 40 percent offer tax credits for angel investors as well as public money for various forms of locally managed, later-stage venture capital.<sup>203</sup> Other states will be more than happy to see Texas exit the start-up arena.

Research shows that a state's future is dependent on firms tied to innovation. States should do everything possible to create the kind of environment that enables innovating firms to emerge, grow, and prosper. The importance of the Emerging Technology Fund cannot be understated in this case.

## **Chapter 313 Agreements**

Chapter 313 agreements attempt to mitigate a huge Texas drawback for manufacturers and other capital intensive businesses: property taxes. In an attempt to ameliorate the tax burden for these types of businesses, school districts are allowed to authorize property tax incentives for a

specified time.

Chapter 313 legislation expires in 2014, and must be reinstated by the Legislature during the upcoming session to continue.

## **Sniper Weapons**

### **CAPCOs**

*"(A CAPCO) isn't just the one thing that fosters job creation...but it does connect to the broader picture, and it's a critical piece because it's that catalyst that starts the spark. It's the seed. It really is that thing that gets it going, to give the entrepreneur a chance."<sup>204</sup>*

Acquiring venture capital is harder than it needs to be in Texas, and Certified Capital Companies (CAPCOs) help to fill the need. A CAPCO is a private government-sponsored venture capital company that helps to increase the amount of growth capital for small businesses located in Texas. The program targets investment in small companies in the state, of which 50% must be considered "early-stage" businesses.

The state of Texas regulates CAPCOs, which get their investment capital from insurance companies. Participating insurance companies are awarded premium tax credits by the state. Once conferred, the tax credit doesn't come into play for five years, giving the program a chance to build jobs, thus negating (in theory) the effect of the tax credit.

### **Events Trust Funds**

Major events, such as the Olympics, require major funding. Communities that host such events have to consider how to provide the up-front money needed for construction, security, transportation, parking and a myriad of other details that such events require. It is generally assumed that large events result in a temporary upswing in sales taxes for the region, as visitors spend money on hotels, food and souvenirs.

However, upfront money can be hard to come by. The comptroller's office, through the Events Trusts Funds, works with the community seeking an application to determine the amount of eligible reimbursable taxes that will accrue during a specific window (the event itself). Reimbursable taxes normally include the general sales and use tax, the motor vehicle rental tax, the hotel tax, the mixed beverage tax, and taxes resulting from Title 5 of the alcoholic beverage code (generally sales of individual drinks and package store sales).

If an application is approved, the monies are sent to the participating community to prepare for the event, and reimbursed to the state at a later date through normal sales tax collection.<sup>205</sup>

### **Freeport Exemptions**

Freeport property includes various types of property that are detained in Texas for 175 days or less to be transported out of Texas. The property tax exemption applies to goods, wares,

merchandise, ores and certain aircraft and aircraft parts. It does not include oil, natural gas and other petroleum products.<sup>206</sup>

### **Texas Moving Image Incentive Program**

A total of \$80 million has been appropriated for incentives since the program's inception, which is not generous compared to other states. Based on approved applications, the Texas Film Commission reported \$598.3 million in direct moving production spending in Texas since the program's inception. It has been estimated that this spending generated \$1.1 billion in statewide economic activity in the State of Texas between 2007 and 2010.<sup>207</sup>

### **Continuing to be Competitive**

Many surveys show Texas to be one of the best states in the nation in which to do business. But one survey, the ALEC-Laffer State Economic Competitive Index, forecasts our future. Of the fifty states, we are currently ranked 18th in competitiveness. That's better than 2010's ranking of 19th, but much worse than our tenth place ranking in 2009.<sup>208</sup>

It's not that we are doing worse. It's that other states are figuring it out, and passing policies and incentives to take us on. This is not the time to backtrack.

### **Recommendations**

Consideration should be given to increasing the amount and number of tax credits for CAPCOs during the 83rd session.

Texas should consider extending the current sales tax exemption for manufacturing equipment to equipment used in R&D, which would send a message that the state wants investment by industries that will work to come up with the next big thing.

Current incentives should be maintained, and funding enhanced where appropriate.

### **And Lastly, Education**

*"We want kids to think critically, to read, to create, but not simply because those things will get them jobs and money. But because a society made up of such people will be a better society. people will make more informed decisions, invent things that help the world rather than harm it, and at least some of the time, put the interests of others ahead of self-interest."<sup>209</sup>*

Is everyone tired of talking about education yet?

A college degree is a wonderful thing. It can open a lot of doors.

Not too long ago, a college diploma, in any subject matter, was all one needed to get a decent paying job. That has changed. Now, our state needs specific talents. We need science, engineering, technology and math (STEM). And while, of course, we need artists, philosophers,

and those who communicate well, our most desperate need at this time is STEM. Put bluntly, those who major in STEM will be more in demand. Their jobs and pay will reflect that. But college is not the only key to a good life.

Those who work well with their hands, those who think critically and quickly on their feet, those with two-year certificates in fields that are desperate for their talents; those people will also see success. We need health care workers and advanced manufacturing workers. We need them badly.

It is time for our public education system to reflect the needs of our state. It is time for us to throw off our misguided biases against career and technical education. We need our kids. It's time to let them know that there are options for their future.

***The best time to plant a tree is twenty years ago. The second best time is now.  
--Chinese proverb***

## ENDNOTES

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