

Texas Regional Location Quotient Matrix Analysis

Where will the jobs come from?

Where are the Texas comparative advantages?

In previous sections of this analysis we examined the question of the role of small and new businesses in Texas job creation. In the final section of this monograph we present a variation of this theme by exploring the importance of regional comparative advantage in job creation. It is beyond the scope of this paper to show data on small business job creation by industry sector or in various regional economies. But no discussion would be complete without exploring the role of regional comparative advantage in job creation. Every region of Texas has its own unique industry structure. Job creation, whether it comes from new or existing businesses, is most likely to be linked to the economic strengths or growth poles of each region.

In fact, in the short and medium term, most future jobs will come from the same industries they came from yesterday.

The composition and magnitude of job growth could change based on a number of factors, but many of these phenomena are beyond our ability to forecast them. Here are four key ways that job growth patterns might change in a regional economy:

- a) **Change in regional comparative advantage;** e.g. discovery of oil shale deposits, water depletion, etc. For example, a railroad spur could allow freight in and out of a community, or a new highway project expands access to a local industrial park. Changes in infrastructure and regional comparative advantage can alter the composition and trajectory of employment growth. A current illustration of this is the discovery of shale oil in the area south of San Antonio referred to as the Eagle Ford Shale region, which has already proven to be an economic boon to an otherwise poor, rural area that will significantly affect regional job growth.
- b) **Positive or negative externalities;** e.g. weather related natural disaster. The 2011 drought in Texas not only hurt farmers and ranchers, but negatively affected companies throughout the agribusiness supply chain. Hurricanes, tornados and other catastrophic weather events often reshape the economies of entire regions.
- c) **Major change in regulatory climate or government policy;** e.g. requirement for federal auto fuel economy or emissions standards, renewable energy stimulus. Not every industry is equally affected by government regulation, but government policies, standards and investments can have a major influence on local job growth.
- d) **Major facility relocation (in or out) or layoffs.** Major dislocations are especially impactful in smaller communities. A plant closing that utilizes many local suppliers may have an even larger ripple effect in a local economy.

Moreover, there are specific reasons why each regional economy has a unique industry mix. In addition to population growth, many of these root causes relate to distinctive natural resource endowments, location advantages, such as access to a deep water port or a highway crossroad, availability of a highly skilled labor force or perceptions of quality of life. Unless there is an erosion or depletion of these comparative advantages, future job growth is likely to be driven by these same advantages.

Texas Has a Competitive Advantage

Texas is expected to experience employment growth due to competitive advantages in both the number of growth industries and the growing numbers of skilled workers in the state, according to a team of economists at banking giant Wells Fargo. In an April 2011 report titled “Employment Dynamics and State Competitiveness,” the Wells Fargo economic researchers analyzed U.S. Department of Labor data to identify which industries nationwide had been adding jobs from 1990 to 2010. The researchers then identified which states had job growth in the growth industries. Texas made the list in reference to several identified growth industries. The Wells Fargo economic researchers stated in their report:

“States with a large number of high-growth industries that also have a large skilled workforce will be at a greater competitive advantage. This would tend to favor states, such as Georgia, North Carolina, Arizona, Virginia and Texas, which not only have a large supply of skilled workers but have also been successful at attracting such workers from other parts of the nation.”

The Wells Fargo team concluded that the major industries that posted the best job growth and had a growing share of the total employment in the United States over the past two decades were:

- 1) Health care and social assistance
- 2) Professional and technical services
- 3) Finance and insurance
- 4) Administrative and waste services

These same industries are also adding jobs in Texas. According to the Wells Fargo team, this should translate into future overall job growth in the state.

Job Growth Will Be Concentrated in Metro Areas

Texas will continue to add jobs but almost all of that job growth will come in the largest metropolitan areas, say economists at IHS Global Insight. The IHS Global Insight team states that major metropolitan areas in Texas have demonstrated above-average job growth in recent years. IHS Global Insight analysts and economists say they expect that job growth in the metro areas should continue to expand at a faster rate than the rural areas of Texas.

In an April 2011 report, IHS Global Insight economists projected that the Austin-Round Rock-San Marcos metropolitan area should experience annual employment growth from 2012 to 2015 of 3.2%, which would be the second fastest growth rate in the country. In addition, the report predicted that both the Dallas-Fort Worth-Arlington metro area and the Houston-Sugar Land-Baytown metro area each would post annual employment growth rates of 2.7%, which would rank those two metro regions #11 and #12 for fastest growth rates in the nation.

“States with a large number of high-growth industries that also have a large skilled workforce will be at a greater competitive advantage.”

Comparative Advantages Using The New Identifier For Texas and its Regions

Within this context of job creation and job elimination data, there are new ways of looking at industries that are best positioned in a state or region for adding jobs due to a comparative advantage. The LMCI researchers in the Texas Workforce Commission have calculated Location Quotients to identify the high and low concentrations of workers in specific industries inside each of the state's 28 Local Workforce Development Areas. (See www.lmci.state.tx.us/LQbubblecharts for detailed matrix maps for each regional workforce development area in Texas.)

To show these competitive advantages around concentrations of workers in an industry, the LMCI team has created the following Texas Location Quotient Matrix maps for several key regions of the state. The matrix shows four different labor market dimensions to trigger the thinking of Texas business and workforce policy makers relative to economic development. The following explanation lays the groundwork for understanding these new Texas Location Quotient Matrixes.

1) Location Quotient

Location quotient measurement is shown with the X axis. A location quotient identifies the concentration of workers in an industry for a state or region compared with the nation. Industries on the right side of the matrix have an especially high concentration of workers relative to the United States. And industries on the left side of the matrix have especially low concentrations of workers relative to the rest of the nation. The matrix shows the industries with the highest and lowest comparative concentrations, i.e. showing which sectors in Texas have a comparative advantage or disadvantage.

The vertical line inside the matrix indicates average location quotient. While the average location quotient score is a 1.0, this matrix is measuring the location quotient scores logarithmically to illustrate the difference. So industries to the right of the vertical line have especially high concentrations of workers. In essence, large location quotient = comparative advantage.

2) Average Weekly Wage

Wages are shown with the Y axis. The Y axis measures the average weekly wage for workers in an industry. So industries in the top part of the matrix pay workers higher wages. Industries in the lower part of the matrix pay lower wages.

The horizontal line inside the matrix is the average weekly wage across all industries. So any industry above the horizontal line has above average wages.

3) Size of Industry Employment

Employment size of an industry is shown by the size of that industry's bubble. The size of the bubble indicates the total employment as of first quarter 2011, so the larger the bubble the more workers are in that industry. Bubbles also illustrate where key industries show up in the matrix.

4) Employment Change Within An Industry

Change in the number of workers in an industry is shown by the color of the bubble. Colors of the bubbles indicate employment growth or shrinkage in Texas. This total industry employment growth or shrinkage change was measured from just before and just after the Great Recession (first quarter 2006 to first quarter 2011). To illustrate the change in an industry's net employment across the Great Recession, shades of blue are used in the bubble. (*see explanation on the next page*)

Selected Texas Industries by Location Quotient and Average Weekly Wage, 1Q 2011

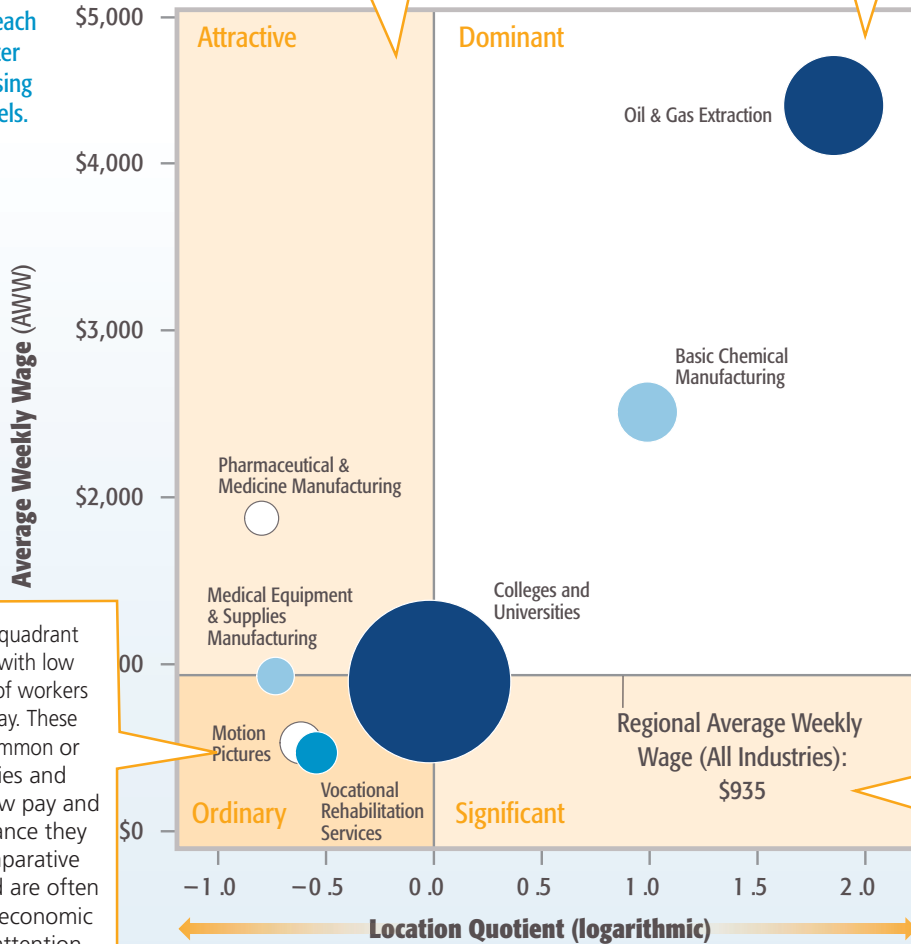
The Texas Location Quotient Matrix (sample with selected industries)

How To Interpret

The quadrants of the matrix are labeled to help identify strengths and opportunities for decision makers in a state or a region. In the matrix map illustration, the LMCI team has also designated each quadrant for better understanding using the following labels.

2) Attractive – this quadrant is for industries with high wages yet relatively low concentrations of workers. While these industries are not dominant in a state or region, these are job sectors that are still providing high wages and are critical to a state's or region's wealth creation, which makes them enticing to economic developers.

1) Dominant – this quadrant is for industries that have a strong concentration of workers as well as high-paying jobs. These industries tend to be growth poles in a state or region.



4) Ordinary – this quadrant is for industries with low concentrations of workers earning lower pay. These can often be common or service industries and due to their low pay and lack of dominance they offer little comparative advantage and are often last to receive economic development attention.

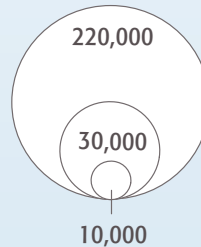
3) Significant – this quadrant is for industries with a high concentration of workers yet at lower pay. These industries tend to be significant contributors to a region's employment base and offer the potential to become quick job creators.

Shades of blue in the bubbles indicate employment growth or shrinkage in Texas

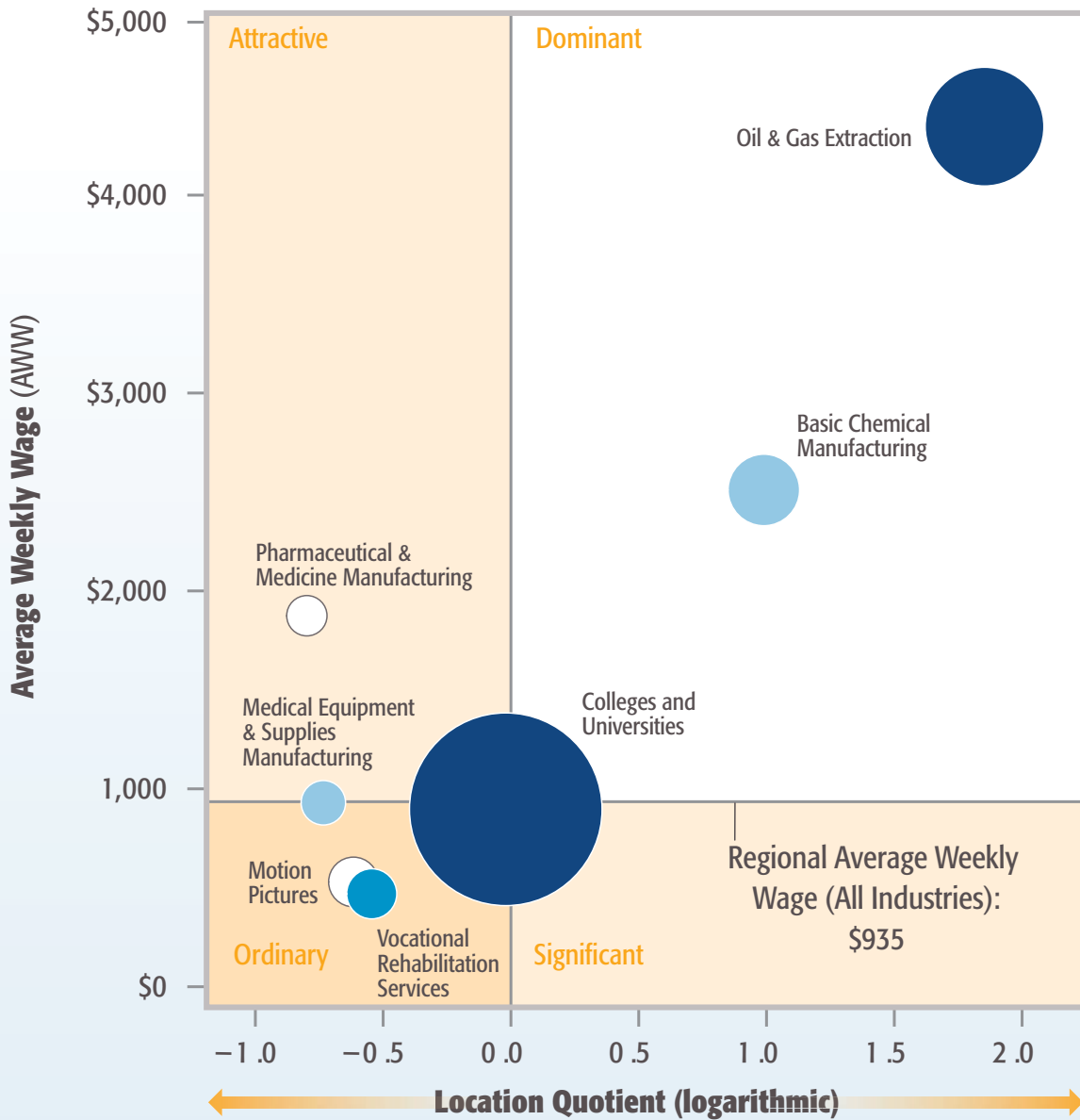
- industry had net employment growth of more than 10%.
- industry had net employment growth of 2-10%.
- industry growth was neutral so that employment was within +/-2% over the time period.
- industry had net employment loss of 2-10%.
- industry had net employment loss of more than 10%.

Job Growth Q12006-Q12011

- Net job growth > 10%
- Net job growth 2-10%
- Net job growth/loss < 2%
- Net job loss 2-10%
- Net job loss > 10%

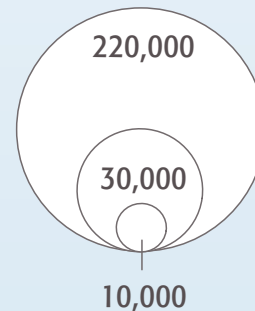


Selected Texas Industries by Location Quotient and Average Weekly Wage, 1Q 2011



Job Growth Q12006-Q12011

- Net job growth > 10%
- Net job growth 2-10%
- Net job growth/loss < 2%
- Net job loss 2-10%
- Net job loss > 10%



To make the Texas Location Quotient Matrix more understandable, some specific industries are used below to explain how the matrix can be interpreted.

What does it mean? Looking at specific industry examples may help readers grasp this new matrix.

Oil & Gas Extraction – This industry is in the Dominant quadrant for a couple reasons. First, the oil & gas extraction industry has an especially high concentration of workers in Texas so it has a high location quotient, which would put it on the right side of the matrix. Second, the oil & gas extraction industry has average weekly wages well above the state average of \$935, which would put it high in the upper half of the matrix. Also, the oil & gas extraction industry employs many workers in Texas, hence it has the larger bubble. And that bubble is dark blue because the oil & gas extraction industry added a lot of workers (16,347 more jobs or a 24% increase from first quarter 2006 to first quarter 2011) in Texas through the Great Recession.

Basic Chemical Manufacturing – This industry is also in the Dominant quadrant because it has above average wages (top half) and high concentration of workers (so high location quotient to put it on the right half of the matrix). The medium size bubble indicates the relative size of the industry in Texas based on the number of workers employed. Also, the basic chemical manufacturing industry bubble is colored light blue because that industry lost workers in Texas during the Great Recession.

Vocational Rehabilitation Services – This industry is in the Ordinary quadrant because it has below average wages and low concentrations of workers. This industry has a small location quotient so its bubble is located on the left side of the matrix – hence Texas does not have a strong comparative advantage in the vocational rehabilitation services field. Also important is that the vocational rehabilitation services industry has a medium blue bubble as this industry lost a lot of jobs in Texas during the Great Recession.

Motion Pictures – Texas has a modest movie making industry but it is smaller than most

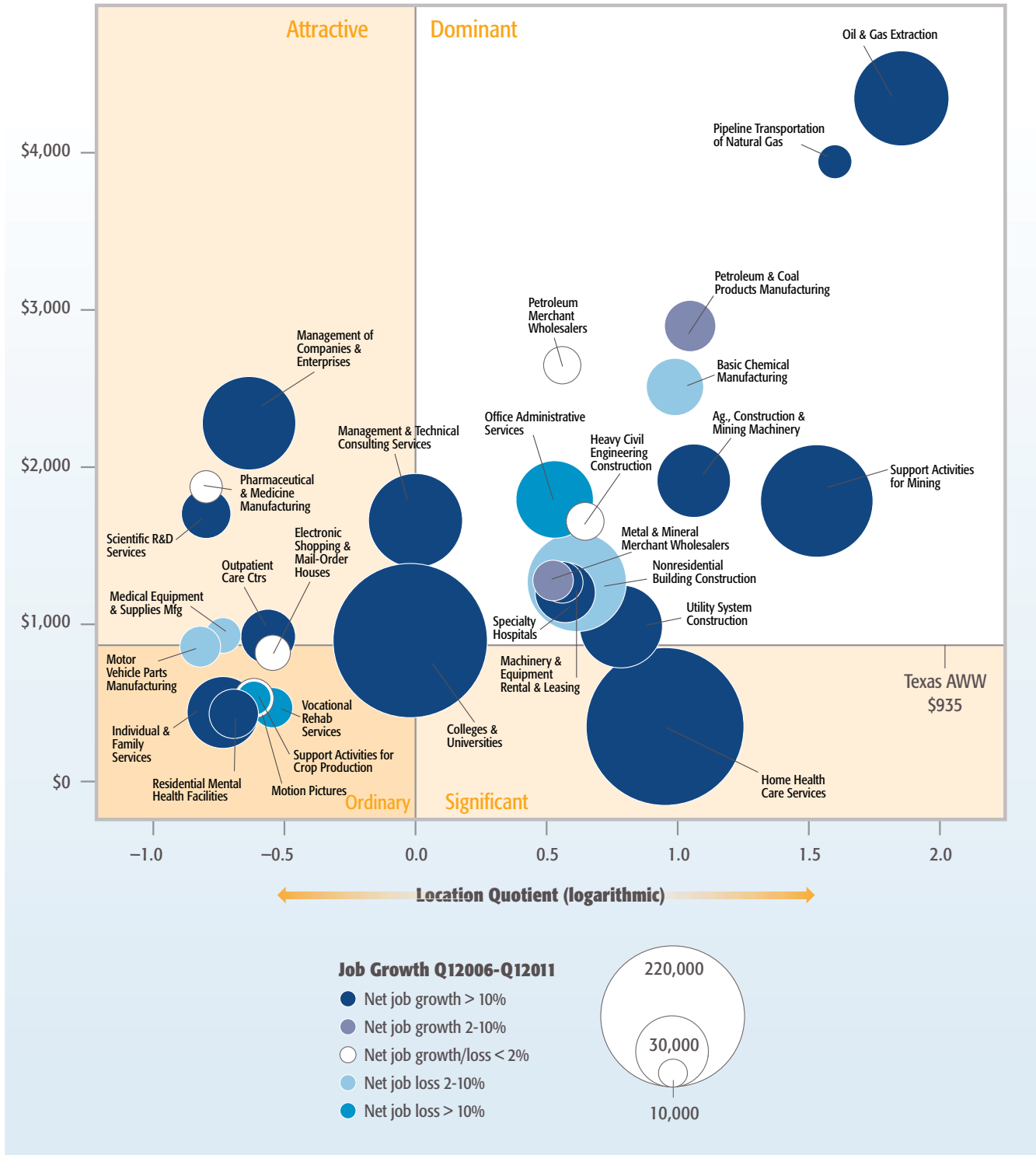
other states so it has a low location quotient and its bubble is on the left side of this matrix. The Texas motion picture industry also has low pay, which is why its bubble is located so far below the average weekly wage line. All of those reasons are why the Texas motion picture industry is located in the Ordinary quadrant on this matrix. Also, the Texas motion picture industry's bubble is white, indicating the employment level was neutral and didn't experience much hiring nor many layoffs during the Great Recession.

Pharmaceutical and Medicine

Manufacturing – This industry has a relatively small number of workers in Texas (small bubble), has above average wages (bubble located above average wage line in upper half of matrix), and does not have high concentrations of workers compared with the rest of the country (bubble located on left side of matrix). The high wages but lack of dominance for the pharmaceutical and medicine manufacturing industry in Texas puts this industry in the Attractive quadrant. Texas does not have a comparative advantage with this industry but its high wages make it enticing to economic developers. Also, this industry did not grow but did not shrink employment in Texas during the Great Recession resulting in a white bubble.

Colleges and Universities – This industry employs a lot of people in Texas – hence the giant bubble. Yet Texas is at the national average for concentration of workers in this industry, which means that Texas does not have a comparative advantage in the higher education field but nor is Texas weak in this field. The college and universities bubble is dark blue because this industry added a lot of jobs in Texas during the Great Recession. This is an example of how the Texas Location Quotient Matrix can stimulate thinking and discussion as observers can readily realize that the data do not show that Texas has strong advantages in the field of higher education and that Texas colleges and universities recently have stopped adding workers.

MATRIX 1 Texas Statewide Location Quotient Matrix 1Q 2011



Matrix 1 shows the top dozen industries statewide in Texas with the highest location quotients (those bubbles on the right side of the graph). Matrix 1 is a more complete matrix than the earlier example. Matrix 1 also shows the dozen industries with the lowest location quotient (those bubbles on the left side of the graph). These new Texas Location Quotient Matrixes are designed to help Workforce Development Area board members and local economic developers better understand the dynamics of their regional economy. Location quotients also show the “core competencies” of a region’s workforce.

And like most business matrixes, the upper right quadrant is the sweet spot.

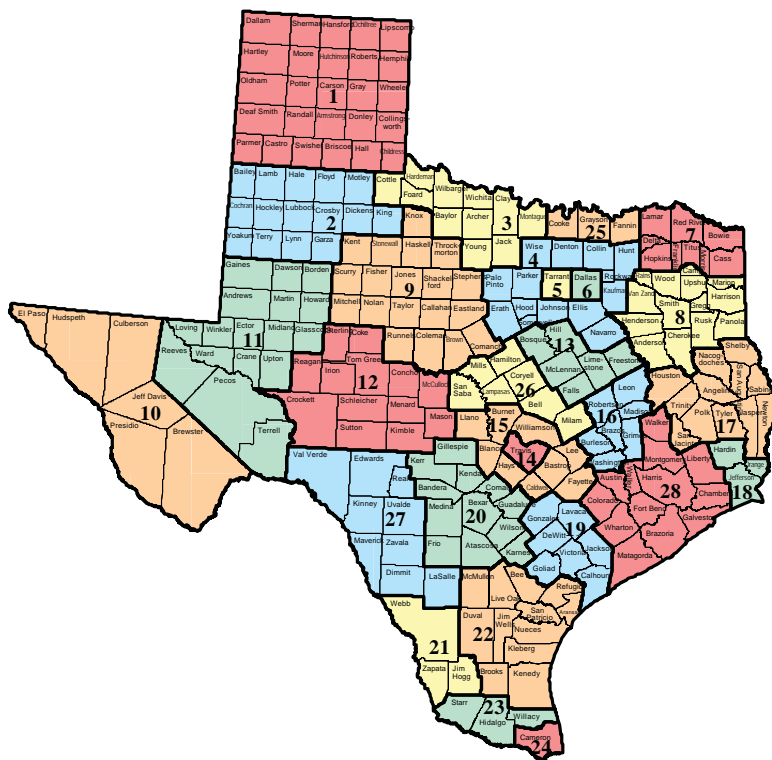
The upper right quadrant is where the high-paying and high-concentration jobs are for a region. Some localized Texas Location Quotient Matrixes follow for specific Local Workforce Areas.

Only industries that had at least 0.09% of the employment in the state or in the related workforce development area were selected for the matrix ranking. This filtered out the tiniest industries.

Not surprisingly, Matrix 1 shows that Texas has concentrations of workers in the growth areas of oil & gas extraction, natural gas pipelines and support services for the oil & gas industry (all in the upper right quadrant) – which also are all higher paying industries. Meanwhile, Texas has low relative concentrations of workers in shrinking industries like motor vehicle parts manufacturing, medical equipment making, scientific research, vocational rehabilitation services and movie making.

The following matrix graphs show the strong and weak industries for 5 of the local workforce development areas across Texas. Each matrix shows the location quotient analysis to identify which industries have high and low concentrations of trained workers since 2006 and which of those industries has been adding or losing jobs since that time. In other words, each matrix shows the industries that have a comparative advantage and the corresponding job creation trend since just before the Great Recession in Texas.

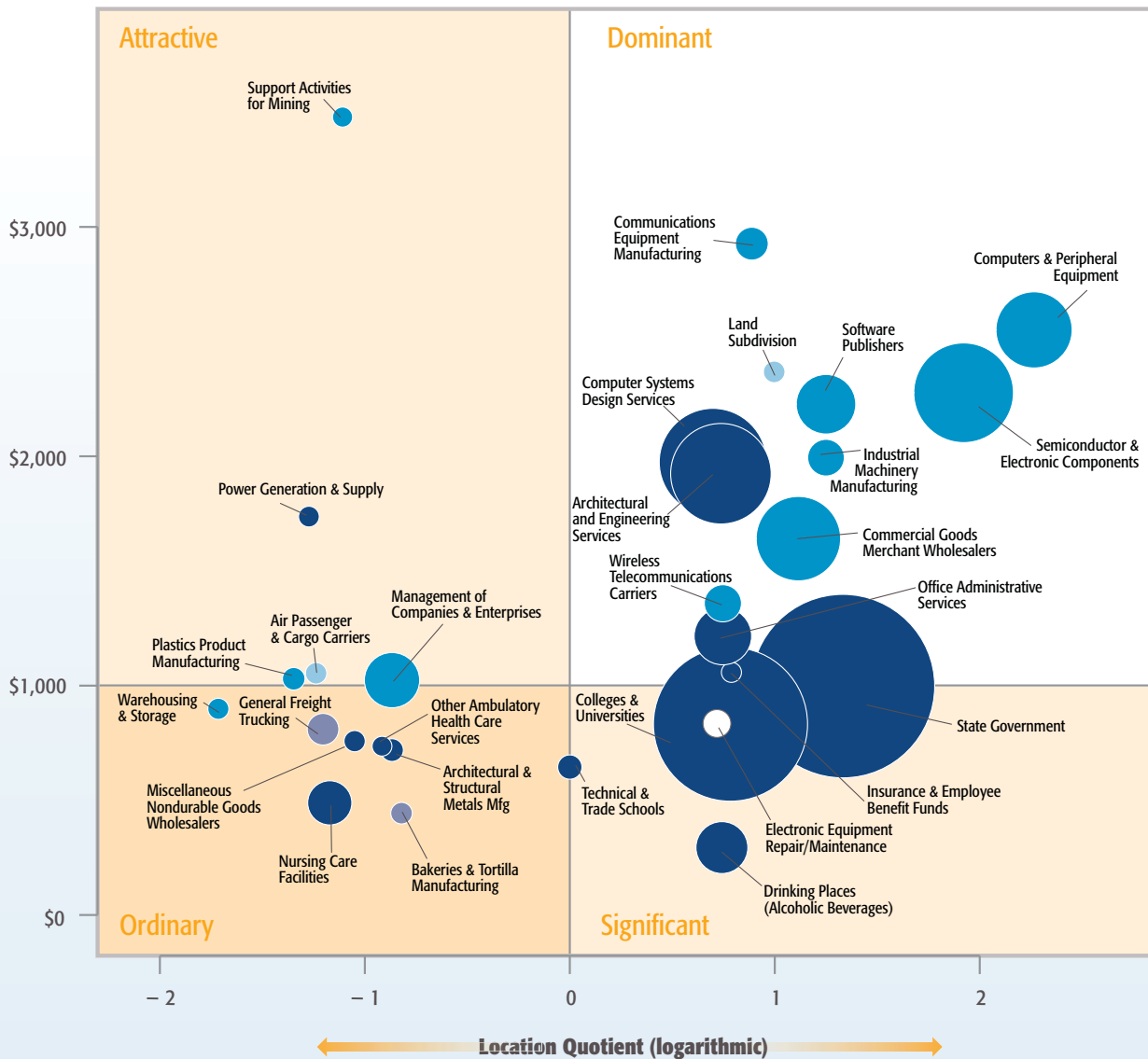
Workforce Development Areas



- Alamo-20
- Brazos-16
- Cameron Co.-24
- Capital Area-14
- Central Texas-26
- Coastal Bend-22
- Concho Valley-12
- Dallas-6
- Deep East Texas-17
- East Texas-8
- Golden Crescent-19
- Gulf Coast-28
- Heart of Texas-13
- Lower Rio Grande-23
- Middle Rio Grande-27
- North Central Texas-4
- North East Texas-7
- North Texas-3
- Panhandle-1
- Permian Basin-11
- Rural Capital Area-15
- Southeast Texas-18
- South Plains-2
- South Texas-21
- Tarrant Co.-5
- Texoma-25
- Upper Rio Grande-10
- West Central Texas-9

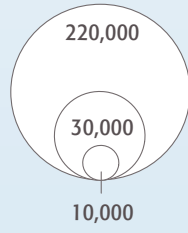
Prepared by the Labor Market Information Department, TWC

MATRIX 2 Austin-Capitol Area WDA LQM



Job Growth Q12006-Q12011

- Net job growth > 10%
- Net job growth 2-10%
- Net job growth/loss < 2%
- Net job loss 2-10%
- Net job loss > 10%



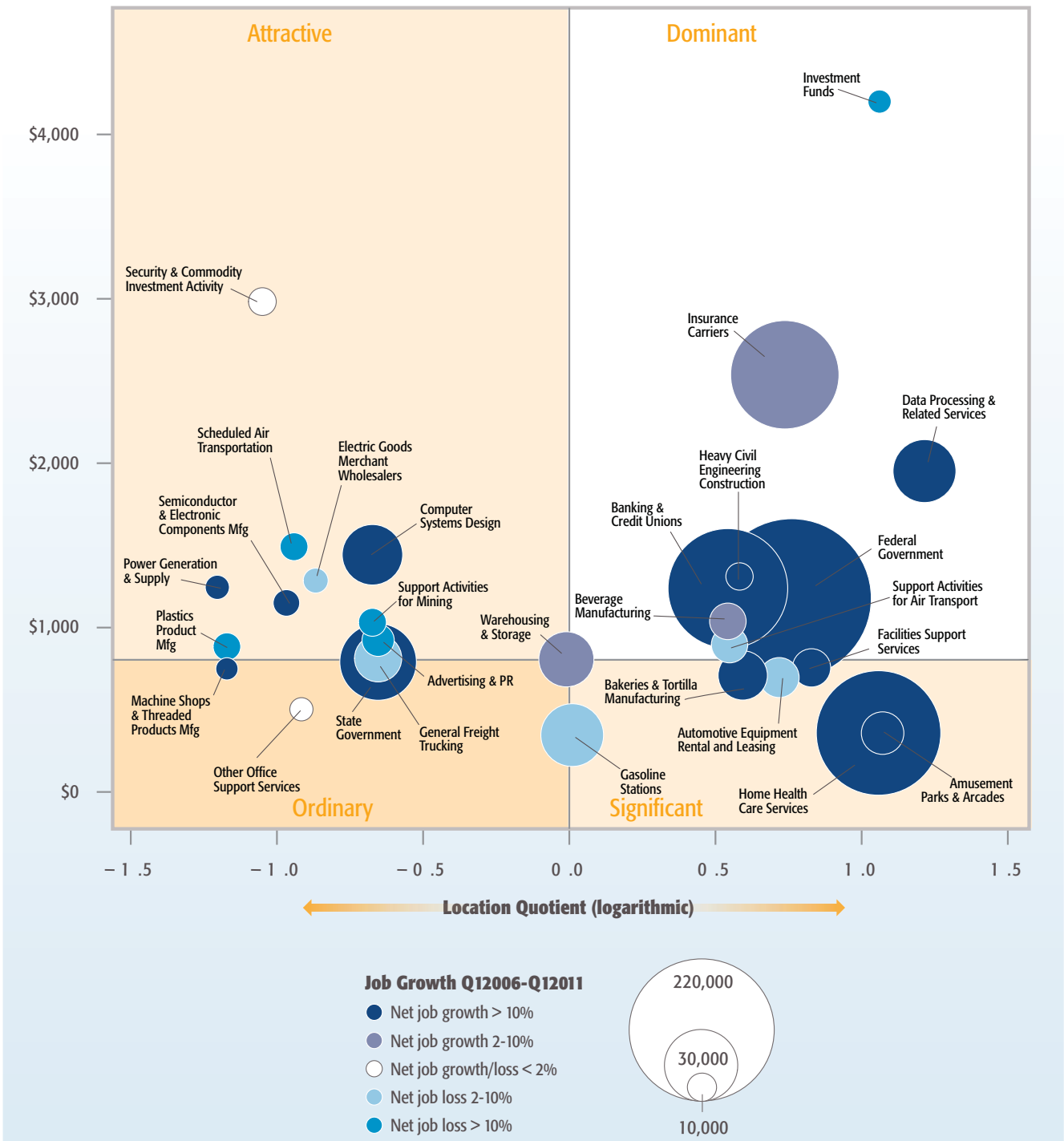
This analysis of wages, concentration of industry workers, and employment level changes shows that the Austin community has key strengths in the areas of:

- Office administration and back office services
- Computer design
- Architectural and engineering services
- Education
- State government

Meanwhile, the Austin area is relatively weak in and has been losing jobs in the following industries:

- Plastic product production
- Warehousing and storage
- Communication equipment manufacturing
- Support services for mining

MATRIX 3 San Antonio-Alamo Area WDA LQM



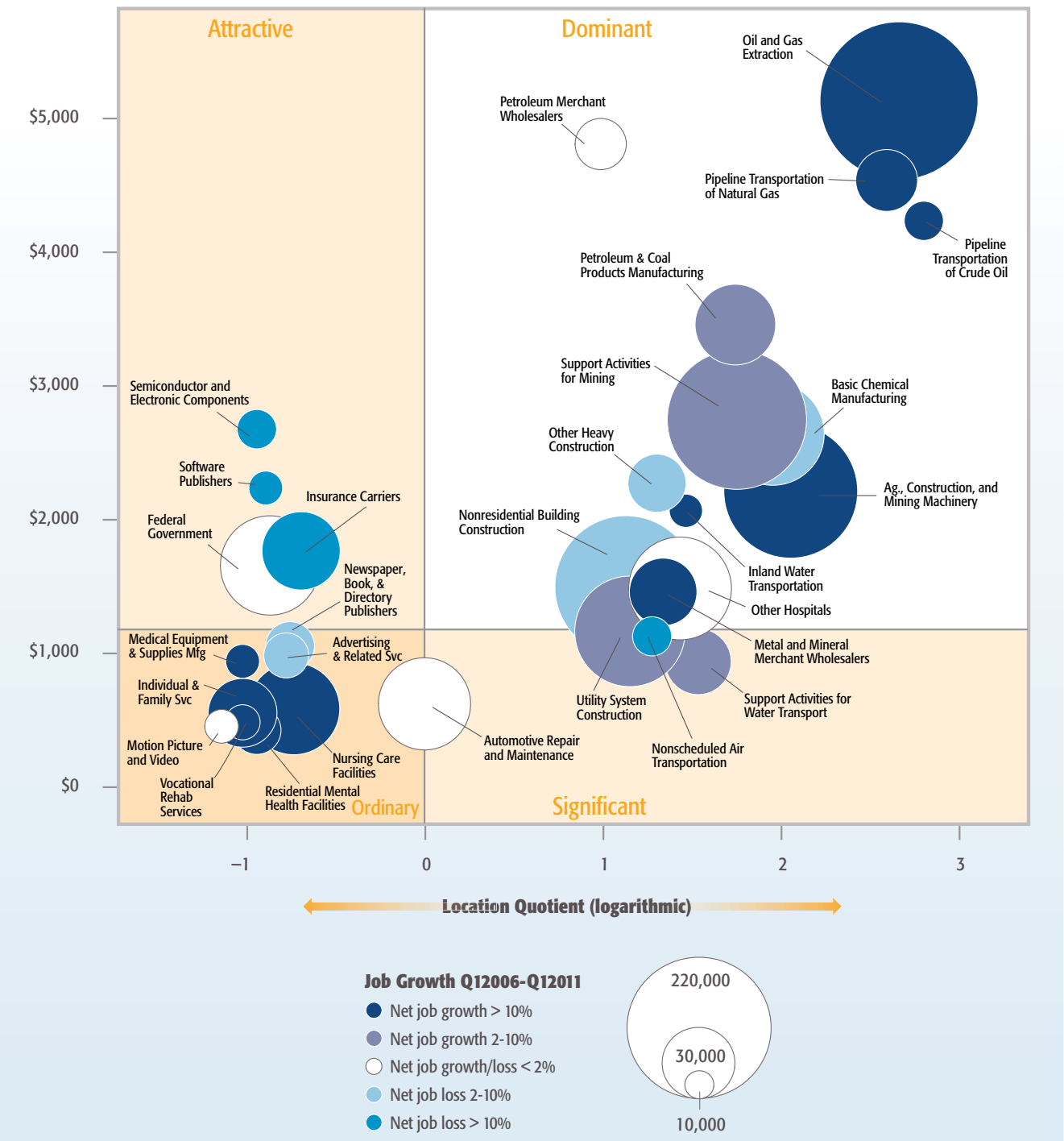
This analysis of wages, concentration of industry workers, and employment level changes shows that the San Antonio metro area has key strengths in the areas of:

- Data processing and data centers
- Insurance carriers
- Building and facilities support services
- Heavy civil engineering services
- Banking and credit unions

The San Antonio area is relatively weak in and has been losing jobs in the following industries:

- Advertising and public relations services
- Plastic products production
- Air carriers
- Airport and airline support services

MATRIX 4 Gulf Coast WDA Location Quotient Matrix



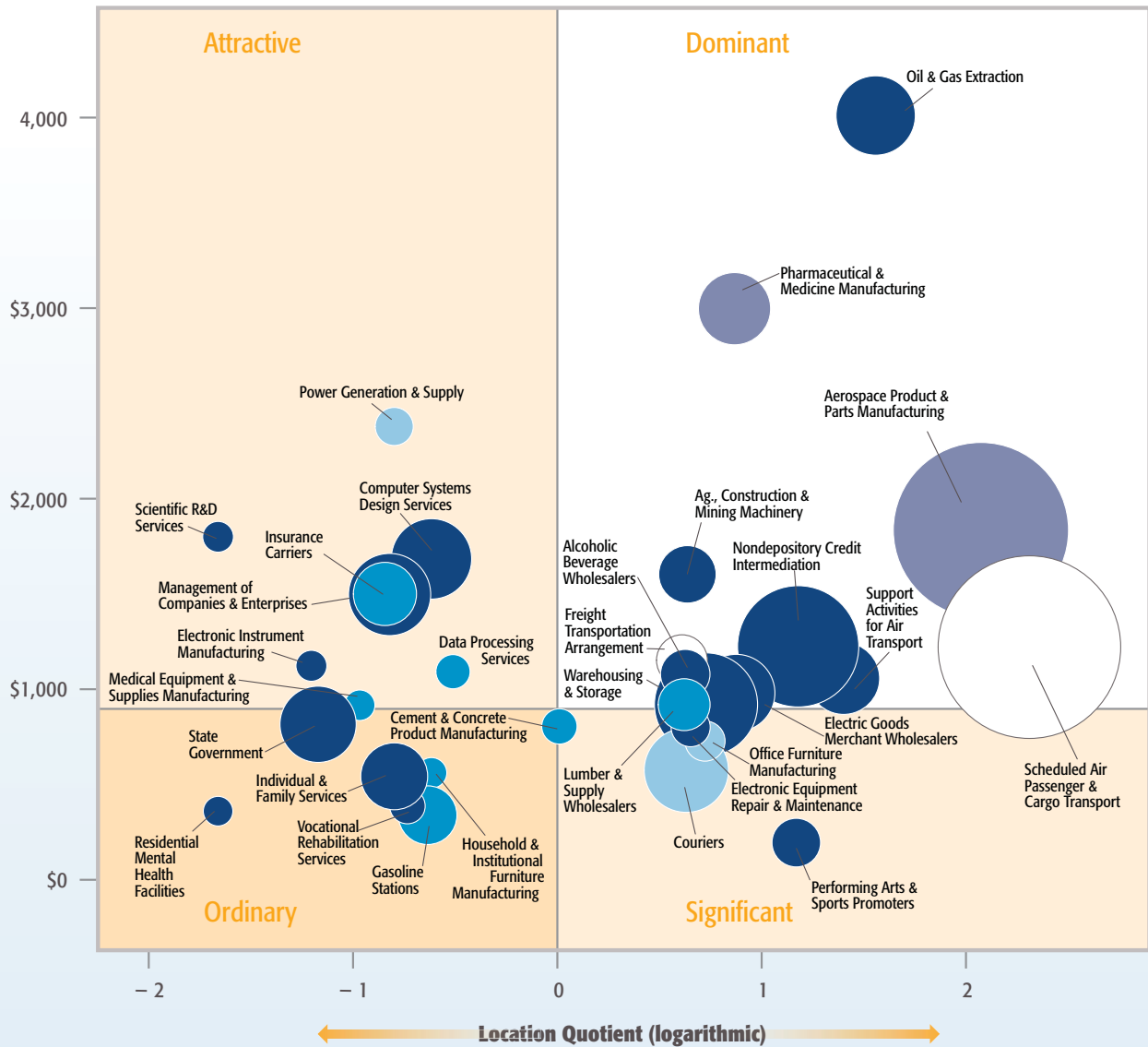
This analysis of wages, concentration of industry workers, and employment level changes shows that the Houston metro area and the Gulf Coast Workforce Development Area have key strengths in the areas of:

- Oil and gas extraction
- Oil pipeline services
- Natural gas pipeline services
- Water transportation

The Houston metro area and the Gulf Coast Workforce Development Area is relatively weak in and has been losing jobs in the following industries:

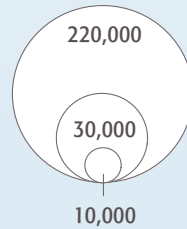
- Agriculture, construction and mining machinery manufacturing
- Software programming
- Advertising and public relations services
- Insurance carriers

MATRIX 5 Tarrant County WDA Location Quotient Matrix



Job Growth Q12006-Q12011

- Net job growth > 10%
- Net job growth 2-10%
- Net job growth/loss < 2%
- Net job loss 2-10%
- Net job loss > 10%



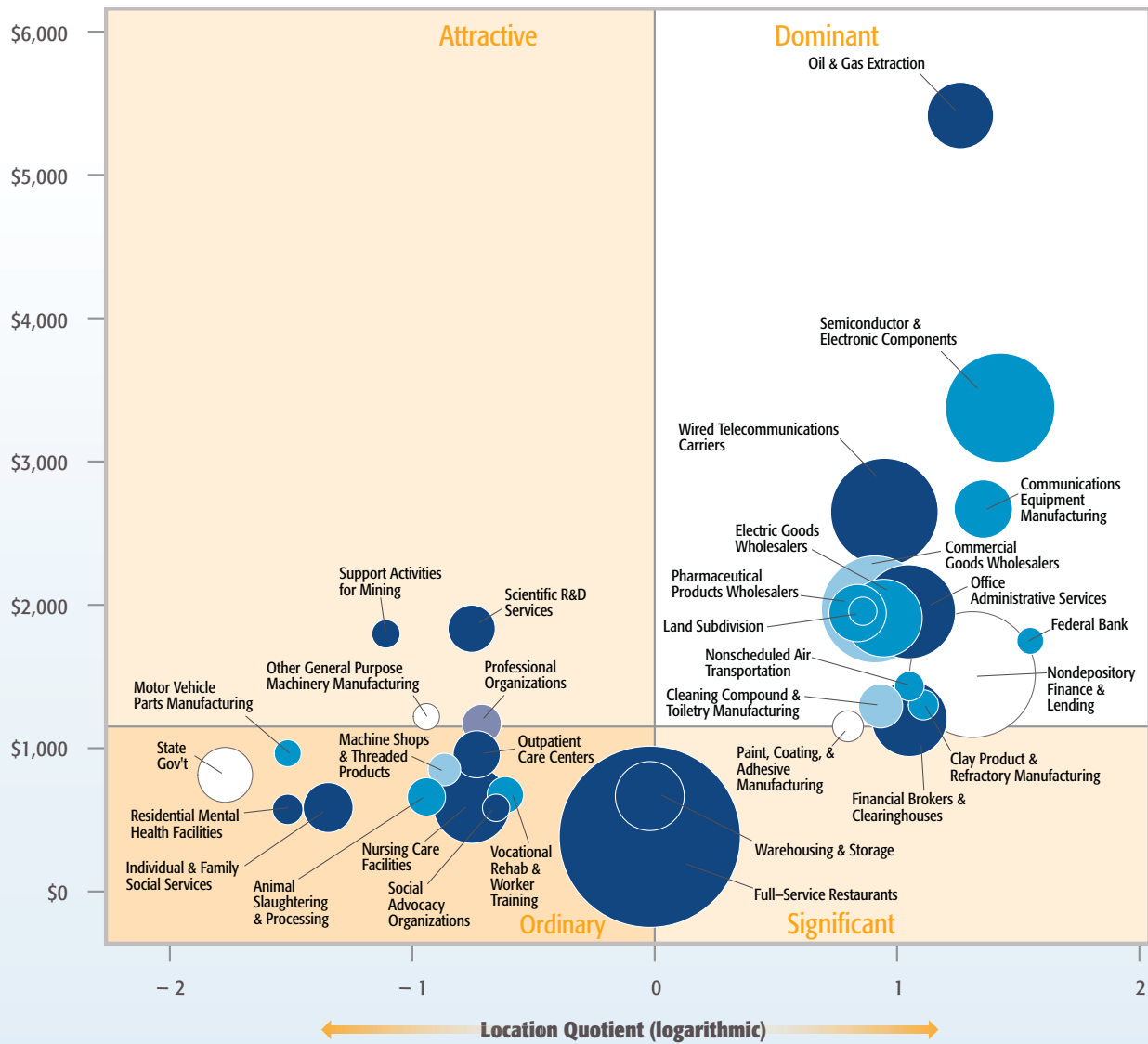
This analysis of wages, concentration of industry workers, and employment level changes shows that Fort Worth and the Tarrant County Workforce Development Area have key strengths in the areas of:

- Oil & gas extraction
- Support activities for air transportation
- Credit cards and other non-depository credit intermediation
- Performing arts and sports
- Manufacturing of agriculture, construction & mining machinery
- Warehousing and storage

The Fort Worth area and its Tarrant County Workforce Development Area has been relatively weak and losing jobs in the following industries:

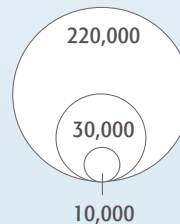
- Data processing
- Furniture manufacturing
- Medical equipment and supply manufacturing

MATRIX 6 Dallas County WDA Location Quotient Matrix



Job Growth Q12006-Q12011

- Net job growth > 10%
- Net job growth 2-10%
- Net job growth/loss < 2%
- Net job loss 2-10%
- Net job loss > 10%



This analysis of wages, concentration of industry workers, and employment level changes shows that the Dallas Workforce Development Area has key strengths in the areas of:

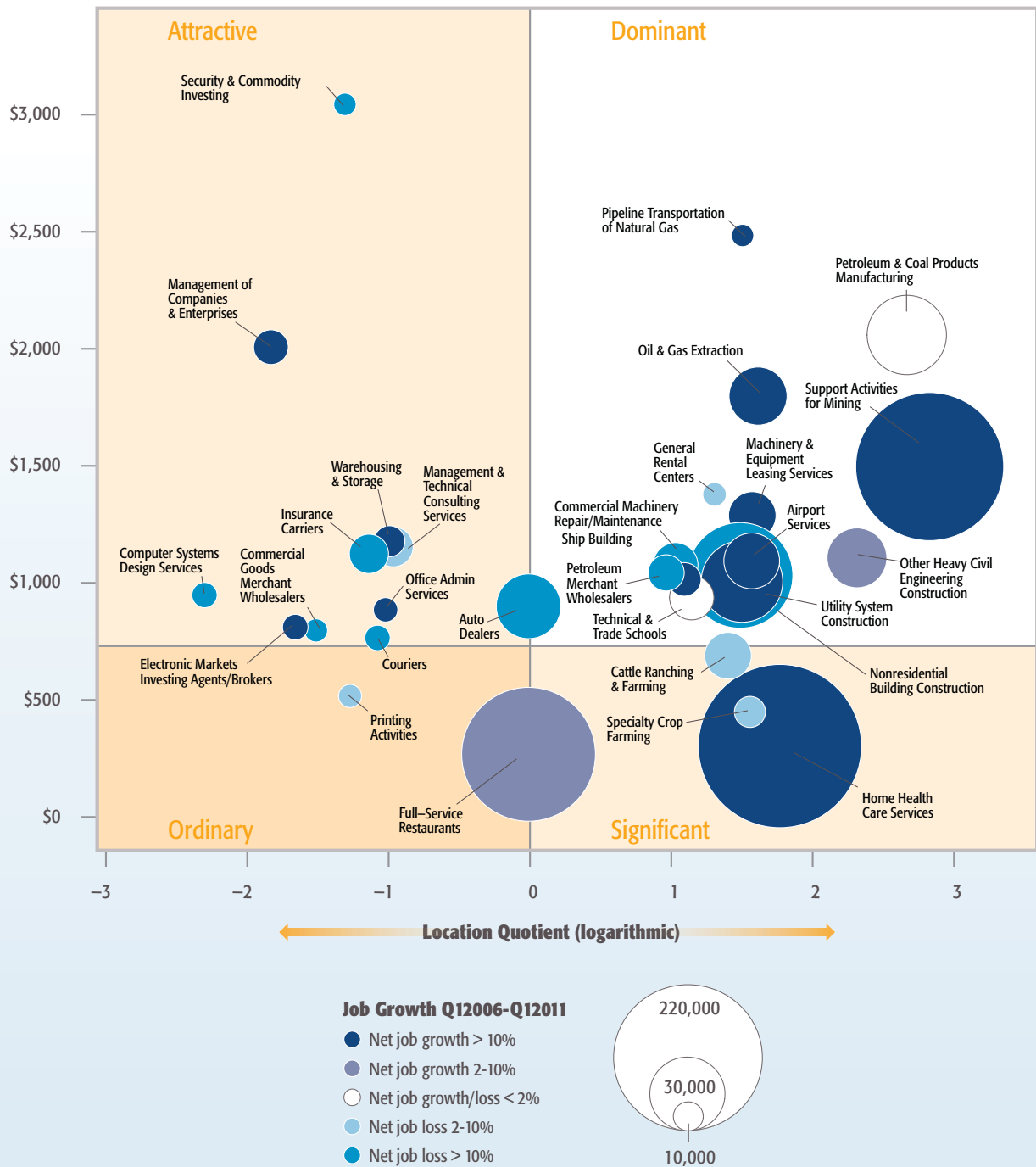
- Support services for mining, oil and natural gas extraction
- Semiconductor and electronic component manufacturing
- Office and back office administration services
- Scientific research

- Specialize banking services, including credit intermediation
- Financial brokers and clearing houses

The Dallas Workforce Development Area is both relatively weak in and has been losing jobs in:

- Motor vehicle parts manufacturing
- Vocational rehabilitation and job training services
- Animal slaughtering and processing

MATRIX 7 Coastal Bend WDA Location Quotient Matrix



This analysis of wages, concentration of industry workers, and employment level changes shows that the Corpus Christi metro area and the Coastal Bend Workforce Development Area have key strengths in:

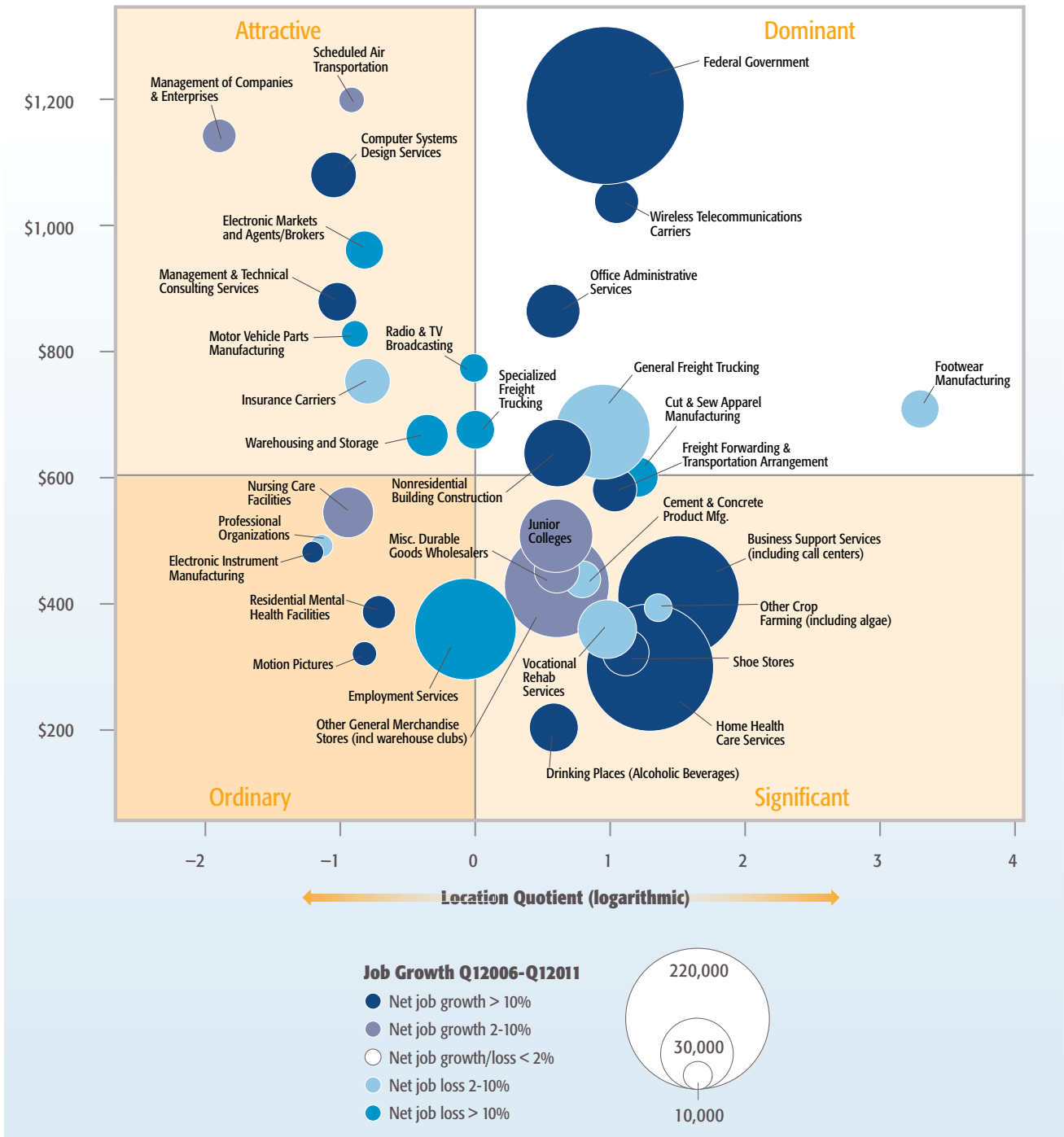
- Utility construction
- Airport services
- Support activities for mining, oil and gas extraction

- Natural gas pipeline services
- Machinery and heavy equipment leasing services

The Corpus Christi area and the Coastal Bend Workforce Development Area are relatively weak in and has been losing jobs in the following industries:

- Commercial goods wholesalers
- Automobile dealers

MATRIX 8 Upper Rio Grande WDA Location Quotient Matrix



This analysis of wages, concentration of industry workers, and employment level changes shows the Upper Rio Grande Workforce Development Area, including El Paso, has key strengths in:

- Office and back office administrative services
- Technical consulting services
- Wireless phone carriers
- Nonresidential construction
- Cement and concrete manufacturing

The Rural Capital Workforce Development Area is relatively weak in and has been losing jobs in:

- Motor vehicle parts manufacturing
- Specialized freight trucking
- Employment services