Oil prices in today’s dollars are now the lowest since the early 1970s. Precipitous declines of oil prices after mid-2014 brought the U.S. shale oil boom to an end. Texas — the nation’s largest state in oil and natural gas production — is bracing for economic headwinds brought by the expected downsizing of its oil and gas industry.

And South Texas is in the eye of the storm simply because of what the newly discovered Eagle Ford shale play has contributed to its regional economy in the past five years.

In a newly published article in an academic journal, Energy Policy, I indeed found that, holding all else constant, the economic impact of extracting oil and gas wells was significantly greater in the Eagle Ford than other shale plays in Texas during the shale oil boom between 2009 and 2014.

This finding alone implies that if the oil and gas industry goes into reverse gear as opposed to what happened before 2015, then the Eagle Ford communities and South Texas as a whole would be hit hard.
The anticipated full impact on the Texas shale regions hasn’t occurred just yet as both oil and gas production continued to grow through the first quarter of 2015. Meanwhile, average production for the existing rigs has in fact soared.

Invisible Hands

How so? First, it is helpful to understand that other than such technological advances as hydraulic fracking and horizontal drilling, the shale oil boom was fueled by developments in the global oil markets. Drilling occurs only when the price of crude oil produced is above the break-even level. After the depths of the 2007-2009 recession, shale oil explorers and drillers responded to oil prices hovering above $80 a barrel along with an outlook of solid market growth spurred by growing energy demand in China and other emerging economies.

Development in the Eagle Ford shale began to unfold in 2008. The number of drilling permits and both oil and gas production in that play rose exponentially through 2014.

Gas vs. Oil Wells

Yet economic impacts varied drastically between oil and gas wells. While there was virtually no difference between an oil well and gas well during their development and drilling phases, gas wells on average brought in at least twice as much in additional total income or employment created as compared to oil wells when the extraction phrase began.

This surprising finding can be explained by the opposite oil and natural gas market dynamics at that time. While crude oil prices were elevated at historically high level above $100 a barrel, natural gas prices stayed at low levels below $5 per million BTU.

At high output prices, an oil well needed not be as productive as otherwise to be economically feasible to operate. In economic terms, new oil wells in Texas then were operating on the top portion of the market supply curve.

This, however, was not the case for gas wells. At prices below $5 per million BTU, a gas well was drilled only if it was sufficiently cost efficient to at least break even. In other words, Texas’ shale gas wells were operating near the bottom portion of the industry production curve. This was the case of survival of the fittest.

But since mid-2014, drillers for oil have appeared to follow the same footsteps as those for natural gas a few years ago.

Source: EIA.
“Drill, Baby, Drill” No More

The short history of the shale oil boom offered some insights into today’s shale industry. Oil market collapses since mid-2014 have paralleled developments in the aftermath of the 2007-2008 financial crisis. Indeed since the beginning of 2015, capital investment for oil drilling has grinded to a halt due to heightened uncertainty amidst a volatile market. As a result, the number of operating oil rigs in Texas has undergone a free fall.

Yet Texas shale oil production continued to grow through mid-year, boosting the average production rate of the existing oil rigs and wells. Like that for gas wells a few years back, now energy companies operate only those oil wells that are most productive or cost efficient.

The break-even prices for oil wells in the Eagle Ford play today are believed to range between $40 and $60 per barrel. So those wells with a unit-cost above the current market price around $50 are most likely to be capped first. And scores of new wells that were once considered profitable have been abandoned at least for the short term.

As this “survival of the fittest” process continues, only wells that are most productive or cost efficient are drilled or kept operational. By late 2015, the average production rate of new oil wells in the Eagle Ford and Permian Basin nearly doubled that a year ago. This positive effect of relatively low energy prices translates into a greater income or job impact for existing active wells.

As oil and gas companies become more selective in drilling new wells, their operations tend to be more environmentally friendly. Oil industry development will also become more economically sustainable in the long run than what would be under the previously high market price environment. So, for all the economic challenges that low oil prices are bringing to Texas, there are nevertheless long-term benefits.

Reference

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Resurgence of an Industry

By Jim Lee

The Coastal Bend is undergoing an industrial renaissance. A construction boom led by a record number of industrial capital projects is generating a surge in demand for construction labor and craft skills. Once completed, those large-scale industrial facilitates will generate a permanent gain of industrial manufacturing employment, reversing the historical trend of that sector.

An industrial renaissance is emerging in South Texas. This transformation will likely promote a prosperous future for its regional economy. After a decade long decline in oil and gas related employment due in part to falling energy prices and rising productivity in the industry, the impact of the oil boom in the Eagle Ford Shale formation, only 70 miles north of Corpus Christi, has now rippled through much of the Coastal Bend. Most popular studies about the economic impacts of the Eagle Ford to date have largely underestimated one major development in Corpus Christi, namely the rise of the manufacturing sector.

Following the national trend, the local manufacturing sector has undergone an extended period of declines as production has been outsourced overseas to notably China and other emerging economies around the world. Between 2001 and 2014, the Coastal Bend lost about 2,400 manufacturing jobs, and the share of the manufacturing sector in total regional employment reduced from 6.6 percent to 4.5 percent. Most of those job losses were offset by gains in service-oriented employment. That declining trend is about to reverse in the Coastal Bend though. Industrial manufacturing is emerging as the fastest growing economic sector, especially in Nueces and San Patricio counties.

Construction Boom
Access to Eagle Ford shale oil and gas through trucks and pipelines, and the logistical advantage of a deepwater port have made Corpus Christi an attractive location for developing heavy manufacturing plants and petrochemical facilities. Along with a rapid recovery of real estate market, the Coastal Bend is in the midst of a construction boom. The current boom can date back to 2011 when Tianjin Pipe Company (TPCO) of China began its construction of a $1 billion steel mill, which will produce seamless steel pipes. The plant is expected to become operational by 2015, when it enters the second phase of development. The TPCO project was followed by an unprecedented number of new construction plans, including an iron plant by the Austrian Voestalpine Group, the Italian M&G Group’s facility that will produce PET resin, and Switzerland-based Trafìgura’s terminal and oil storage facilities.

<table>
<thead>
<tr>
<th>Company</th>
<th>Facility</th>
<th>Investment ($ Million)</th>
<th>Operation Year</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPCO</td>
<td>Steel Mill</td>
<td>1,300</td>
<td>2014</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Phase II</td>
</tr>
<tr>
<td>OxyChem</td>
<td>Propane Distribution</td>
<td>70</td>
<td>2015</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LyondellBassel</td>
<td>Ethylene Plant</td>
<td>400</td>
<td>2015</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>voestalpine</td>
<td>Steel Mill</td>
<td>700</td>
<td>2016</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OxyChem</td>
<td>Ethylene Plant</td>
<td>1,400</td>
<td>2016</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M&amp;G Group</td>
<td>PET Plant</td>
<td>751</td>
<td>2016</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CCI</td>
<td>Condensate Splitter</td>
<td>400</td>
<td>2016</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cheniere</td>
<td>LNG Plant</td>
<td>12,000</td>
<td>2017</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Construction Jobs | 580 | 1,910 | 1,378 | 1,213 |
| Permanent Jobs    | 300 | 800   | 1,480 |
In addition to those industrial facilities that will take advantage of the abundant energy supplies in South Texas, the Eagle Ford oil and gas production boom has prompted a record number of development projects for petrochemical facilities in Corpus Christi’s Port District around Corpus Christi Bay and Nueces Bay. For instance, Houston-based Cheniere Energy has announced the construction of a liquefied natural gas (LNG) export terminal at $12 billion, and Castleton Commodities International (CCI) is slated to invest $400 million for the construction of a condensate splitter complex. Meanwhile, nearly all existing petrochemical plants in Corpus Christi are undergoing expansion.

**Workforce Shortage**

According to a recent study (Lee 2014), the large number of capital projects within the Corpus Christi Port District will require a total of about 1,300 construction and craft workers per year on average through the end of 2017. Between 2013 and 2017, there will be an additional workforce need for nearly 600 construction laborers per year, followed by 264 additional first-line supervisors and 248 operating engineers.

<table>
<thead>
<tr>
<th>Occupation</th>
<th>2013</th>
<th>2017</th>
<th>Change</th>
<th>2013 Hourly Wage</th>
<th>Education Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Laborers</td>
<td>3,175</td>
<td>3,772</td>
<td>597</td>
<td>$11.66</td>
<td>Short-term on-the-job training</td>
</tr>
<tr>
<td>First-Line Supervisors</td>
<td>1,425</td>
<td>1,689</td>
<td>264</td>
<td>$24.43</td>
<td>Work experience in a related occupation</td>
</tr>
<tr>
<td>Operating Engineers &amp; Other Equipment Operators</td>
<td>952</td>
<td>1,200</td>
<td>248</td>
<td>$15.68</td>
<td>Moderate-term on-the-job training</td>
</tr>
<tr>
<td>Carpenters</td>
<td>979</td>
<td>1,153</td>
<td>174</td>
<td>$15.32</td>
<td>Long-term on-the-job training</td>
</tr>
<tr>
<td>Plumbers, Pipefitters, &amp; Steamfitters</td>
<td>1,055</td>
<td>1,221</td>
<td>166</td>
<td>$18.39</td>
<td>Long-term on-the-job training</td>
</tr>
<tr>
<td>Electricians</td>
<td>1,228</td>
<td>1,389</td>
<td>161</td>
<td>$19.84</td>
<td>Long-term on-the-job training</td>
</tr>
<tr>
<td>Construction Managers</td>
<td>663</td>
<td>795</td>
<td>132</td>
<td>$30.81</td>
<td>Bachelor's degree</td>
</tr>
<tr>
<td>Welders, Cutters, Solderers, &amp; Brazers</td>
<td>400</td>
<td>498</td>
<td>98</td>
<td>$18.80</td>
<td>Postsecondary non-degree award</td>
</tr>
<tr>
<td>Heating, AC, Refrigeration Mechanics &amp; Installers</td>
<td>389</td>
<td>483</td>
<td>94</td>
<td>$17.86</td>
<td>Postsecondary non-degree award</td>
</tr>
<tr>
<td>Office Clerks, General</td>
<td>579</td>
<td>670</td>
<td>91</td>
<td>$11.48</td>
<td>Short-term on-the-job training</td>
</tr>
<tr>
<td>Heavy &amp; Tractor-Trailer Truck Drivers</td>
<td>414</td>
<td>498</td>
<td>84</td>
<td>$15.74</td>
<td>Short-term on-the-job training</td>
</tr>
</tbody>
</table>

Sources: Texas Workforce Commission, Lee (2014), and author’s calculations.

In the absence of those large-scaled capital projects, a projected increase of 2,084 construction and craft skills jobs will be needed to accommodate the “natural” growth of the regional labor market through 2017. At its peak, the new industrial construction activity will require another 2,000 more positions in the local construction industry.

One distinction of those additional construction jobs is that they are not permanent positions. Also, the timelines of those projects are not perfectly aligned, such that not all construction workers will be needed at the same time. The staggering nature of those projects will allow some workers to move from one completed site to another site.

The local construction industry is facing an unemployment rate about 10 percent, more than double the overall regional unemployment rate. The majority of the unemployed are construction laborers and helpers that do not have specific skills. On the contrary, those craft skills that are in high demand, such as engineers and equipment operators, carpenters, plumbers, welders and electricians, do require formal training. Before 2018, the surge in demand for craft skills will likely exceed the existing workforce training capacity of the region. As a result, wages for construction and craft workers will likely rise more rapidly than the current growth pace at about 6 percent annually. Yet potential labor shortages might also be mitigated by hiring workers from other regions outside the Coastal Bend.

**Regional Employment Outlook**

Once constructed, each of those new industrial facilities will be staffed with permanent employees. By 2018, when most of those facilities will have become operational, there will be an estimated increase of 1,480 full-time-equivalent permanent job positions.

The above estimates for local jobs associated with the current industrial developments in Corpus Christi represent only direct employment effects. Those projects also create additional, or ripple, effects on the rest of the Coastal Bend economy. First, construction activity generates spillover effects on other local industries, from banking and business services to restaurants and education. Likewise, those industrial sites’ operations will also generate ongoing spillover effects on the rest of the region through both their benefits to their local suppliers and their employees. Those economic impacts are commonly referred to as secondary effects that ripple through various corners of the community.

Including those secondary effects, the construction and operation of those industrial facilities will generate a sizable impact on overall employment in the Coastal Bend. The first chart on the next page illustrates their total employment impact...
on the region over time through 2018. The area labeled as “baseline” delineates regional employment forecasts drawing on projected future trends across local industries, without the consideration of those capital projects. Driven by the Eagle Ford development, the region is already expected to gain employment by about 2.5 percent over the next two years, more than twice its historical average. The dashed line labeled as “projection” reflects the forecasts that also take into account the total employment impacts, including both direct and secondary effects, of those major industrial developments.

**Impact of Industrial Developments on Coastal Bend Employment**

Between 2014 and 2018, those industrial projects together are expected to add a cumulative total of 3,663 jobs to the Coastal Bend, in addition to the baseline estimates. The amount of additional jobs is equivalent to 1.4 percent of the projected regional employment, and it adds to the baseline annual employment growth by another one-half of one percent on average. The peak of economic impact will occur in 2015, when regional employment is expected to grow by 3.2 percent. By 2018, the impacts of those industrial facilities will shift from primarily construction-related employment that is only temporary in nature to permanent, manufacturing-oriented employment.

**Coastal Bend Employment Growth Forecasts**

In addition to the overall employment level for the region, the current industrial developments will alter the composition of regional employment by changing the structure of the regional industry base. The construction of those industrial sites will spur short-term demand for workforce in construction, such as welders, pipefitters, electricians and laborers. Once constructed, those industrial facilities will begin to boost employment in the heavy manufacturing sector. Such developments will help reverse the historical trends of declines in employment in the industrial manufacturing sector.

Between 2013 and 2018, the manufacturing sector is expected to add nearly 2,700 jobs. Employment growth of 32 percent in this sector will be more than twice the projected average of 13 percent growth across all industries during that period. Most of the job growth in manufacturing will be found among manufacturers of petroleum, rubber and steel products.

The economic landscape of the Coastal Bend is about to shift. While the impacts of the Eagle Ford Shale will someday dissipate simply because of the very nature of oil and gas as exhaustible or nonrenewable natural resources, current developments in the shadow of the South Texas oil boom might leave a permanent mark in the region. Reversing the past declining trend, the industrial manufacturing sector is emerging as a major driver for the region’s future economic growth.
This study is the second of a series that focuses on the regional economic outlook in the shadow of the Eagle Ford oil boom. The article is adapted from a report prepared for Workforce Solutions of the Costal Bend, titled “Industry Cluster Analysis for the Coastal Bend Workforce Development Area: 2014 Update.”

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