

Economic Analysis

Rekindling Old Ties: A Closer Look into What Risks Lie Ahead for Texas if Oil Prices Collapse

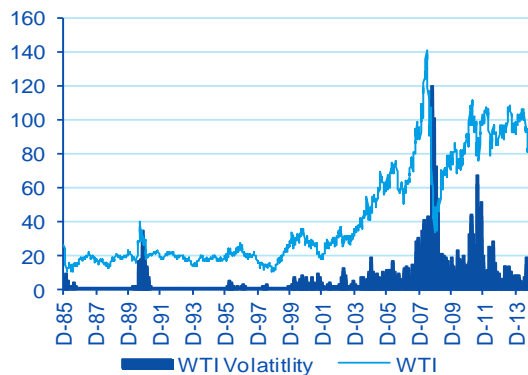
Boyd Nash-Stacey

- **An oil prices collapse will create headwinds for Texas' economy**
- **Texas diversification implies less severe risk scenario than 1980s**
- **More dependent metros and smaller firms have greatest risk exposure**
- **Measured price declines could boost consumption and aid recovery in handful of states**

Since July 2014, West Texas Intermediate (WTI) crude oil spot and 6-month ahead future contract prices have slid below \$80/bbl and are now near 2010 lows, unsettling investors and regions with large exposure to the Oil & Gas sector (O&G). In the 1980, 1990s and 2000s the U.S. was the largest importer of crude oil that meant lower oil prices were an unequivocal benefit to U.S. growth. However in 21st century, the proliferation of hydraulic fracturing and horizontal drilling, and the subsequent boom in drilling and exploration activity, crude production, transportation and refining has been a major contributor to the U.S. recovery and growth in states with high concentrations of mining activity. This transformation and slow recovery outside of the mining sector raises three key questions about lower oil prices and economic activity: 1) What explains the unexpected price drop? 2) Is this a transitory or persistent shock? 3) What are the economic implications of lower oil prices?

Chart 1

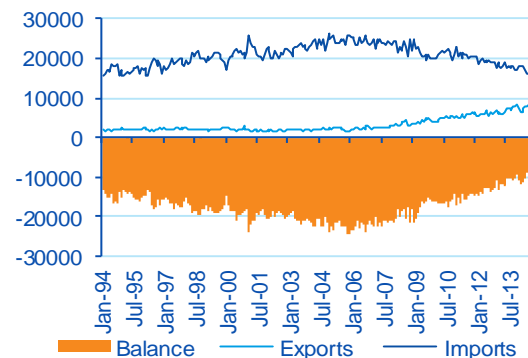
West Texas Intermediate Prices (\$)& Volatility



Source: BBVA Research & Haver Analytics

Chart 2

U.S. Petroleum Imports, Exports & Balance (M 2009\$)



Source: BBVA Research & Haver Analytics

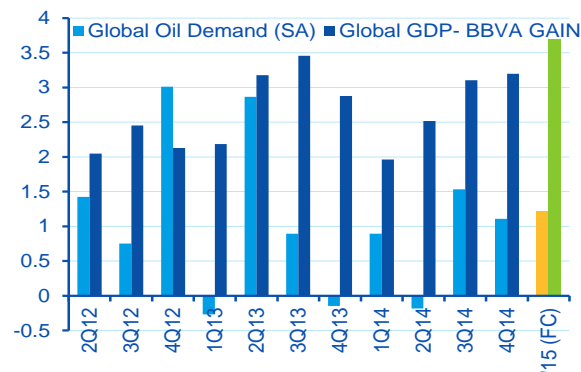
To great extent, the oil price drop reflects an adjustment in market expectations of long-run demand, global production levels and growth in Europe and China without a subsequent adjustment in supply. In fact, on October 14, the International Energy Agency (I.E.A.) revised down its 2014 and 2015 expectations for crude oil demand based on slower economic growth assumptions, and a downshift in demand for petroleum products in major OECD countries. For Europe, low inflation and a declaration in activity also suggest lower demand all else

equal. In China, lower-than-anticipated growth and downward revisions to long-run expectations also add to the downside bias for demand. It is worth noting that since China became a member of the WTO, oil prices have averaged \$80/bbl at current constant prices.

On the supply side, there have also been reports that major OPEC producers will not respond to lower demand expectations for crude oil products with lower output. In fact, Saudi Aramco has lowered its gulf coast delivery price to the U.S., while raising it to many other major regions in Europe and Asia. Regardless of the motives for the drop in delivery prices, which have been suggested to be a response to the rapid growth in production capacity in the U.S. and risk of losing market share, greater supply will add to the downside impetus for oil prices. Therefore, in the absence of a turnaround in global economic conditions, an adjustment in supply or a spike in geopolitical risks, there are fewer upside risks for oil prices. From a structural perspective, technological change, shifts in industry composition, greater reliance on renewable energy and changes in behavior, further restrain upside risks.

Chart 3

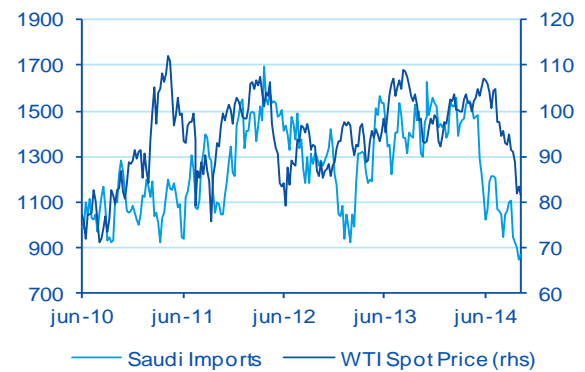
U.S. Petroleum Imports, Exports & Balance (%)



Source: BBVA Research & I.E.A.

Chart 4

Saudi Arabia Petroleum Imports to U.S. (K bpd) & WTI Prices(\$)



Source: BBVA Research & Haver Analytics

2014 Texas Unwed To O&G Sector, But Bonds Strengthening

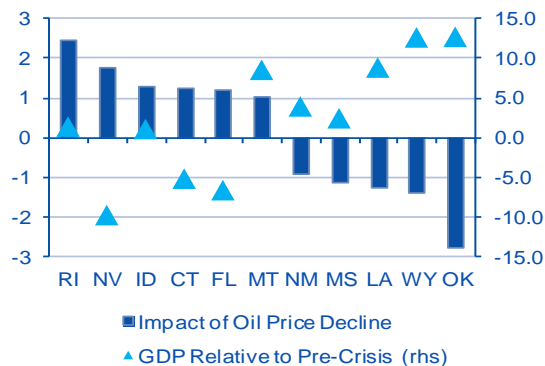
Before discussing the downside to lower oil prices for mining dependent regions, it is important to note that there are positive implications from lower oil prices in the U.S. First, lower oil prices should translate into a lower energy cost burden for the average household. These benefits are amplified for lower income groups –which have a greater propensity to consume- as they shift spending from energy to goods and services with greater multipliers. A similar impact occurs among firms when savings from lower energy prices are invested and used for hiring. As a result, lower oil prices have the potential to boost economic growth. However, the changing mix of consumption and the greater reliance on domestic production of crude oil could imply a lower domestic impact. In addition, since lower oil prices drive down headline consumer prices, the inflation-adjusted (real) impact on the economy is reduced. Furthermore, the underlying drivers of lower oil prices could limit the upside if the decline in prices is motivated by expectations of a global recession or a plunge in asset prices and confidence. Likewise, if lower oil prices are accompanied by a stronger dollar, the benefits in consumption could be offset by cheaper imports.

At a regional level, the states that are most likely to benefit from lower oil prices are those that suffered bigger losses from the Great Recession and the collapse of the housing market. This will help realign regional growth which has been marked by a significant divergence between energy producing states and non-energy producing states.

For Texas, favorable world prices and widespread adoption of hydraulic fracturing techniques has had profound effects on Texas' labor markets and economic growth. In fact, since 2009, Texas has added more jobs than any state, seen annual real incomes rise by the second fastest rate in the country (3.5%) and home prices rise to levels 17% above pre-recession peaks. Per capita real GDP –which stands 7% above the U.S. - has also completely offset the losses from the last crisis. Not surprisingly, since 2009, net domestic and international migration to the state increased by 1 million people. This was almost 3 times larger than California's total net migration in the same period. As a result of strong population inflows and strong corporate investment, Texas real GDP increased at an average of almost 5% in 2011-2013, allowing the state to post the third fastest expansion between 2007 and 2013, when compared with 30 of the top developed economies in the world. However, as a result, Texas has some of the greatest exposure to the O&G sector, which suggests that persistently low prices, or sharp drop in prices, would create economic headwinds.

Chart 5

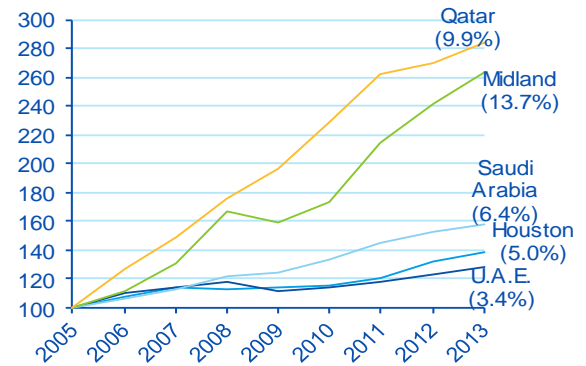
Impact of 10% Oil Price Decline (%) & Economic Recovery (PP)



Source: BBVA Research & Haver Analytics

Chart 6

World GDP Index (2005=100)



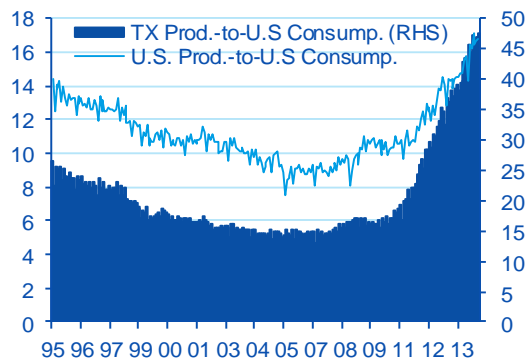
Source: BBVA Research & Haver Analytics

For MSAs with close ties to the oil and gas (O&G) sector such as Houston, Midland, Odessa and lately San Antonio (located near the Eagle Ford Shale formation), growth has been above average. For example, Houston's position as the epicenter of mining in Texas has catapulted the city to levels comparable to major Middle East crude exporters, but with greater economic diversity, infrastructure and institutions. For instance, in 2012, Houston's GDP was 1.9 times larger than the United Arab Emirates (U.A.E.), and was growing at a rate 155bp higher; yet, only 16.5% of economic activity was devoted to mining whereas the share in the U.A.E. is 39.1%. For Midland, which devotes half of its economic resources to mining, economic activity has doubled in real terms over the past 7 years, with an average annual GDP growth rate of 11.8%. Likewise, Odessa, which has the second highest concentration of mining in the state, grew 18.7% in 2011, 17.1% in 2012 and 5.0% in 2013. For San Antonio, the benefits to a vibrant mining sector are only beginning to impact the overall economy. Nevertheless, the city is growing at a pace 1.7pp higher than the U.S. average.

However, Texas has more than doubled production from 1.1 M/bpd to 2.5M M/bpd in the 4 year period ending in 2013. In addition, as of 2013, Texas was the ninth largest oil producer in the world, when compared against other countries, and accounted for 34% of domestic crude oil production. As of July, Texas ranked as the 6th largest producer in the world with production of 3.2 M/bpd. The rapid surge in oil production relative to growth and employment, and unquestioned benefit to the recovery, raise questions specific to Texas' about how susceptible the Texas economy would be to a sharp drop in oil prices and if the economy is fundamentally different from 1980s. Today there are striking differences with the 1980s –when Texas suffered one of the worst recessions ever- which suggest that the downside risks are relatively contained. For example, greater economic diversification, increased trade openness, regional and national bank financing, and absence of a real estate bubble, to name a few.

Chart 7

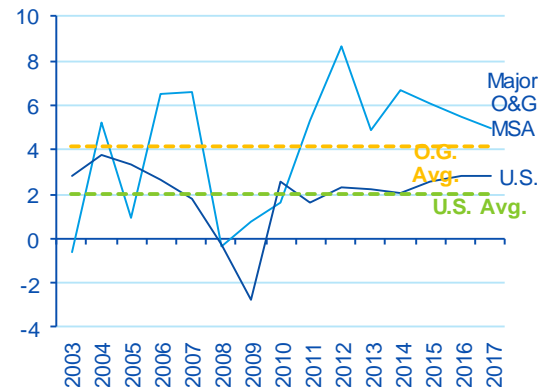
U.S. & Texas Production vs. Domestic Crude Oil Demand (share of total, %)



Source: BBVA Research & Haver Analytics

Chart 8

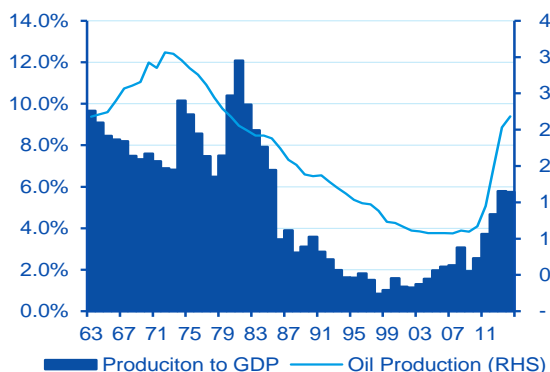
MSAs w/ High Concentrations of O&G in Texas vs. U.S. Growth (%)



Source: BBVA Research & Haver Analytics

Chart 9

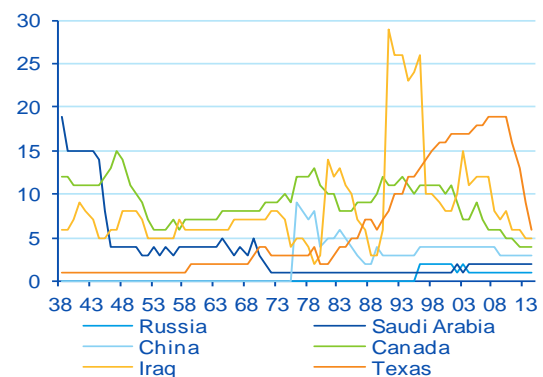
Texas Oil Production (M bbl) & Texas Production-to-GDP (share of total, %)



Source: BBVA Research & Haver Analytics

Chart 10

Global Crude Oil Production Rank



Source: BBVA Research & Haver Analytics

In terms of concentration, O&G extraction establishments have declined as a share of total establishments against other industries such as physicians' offices and computer system designers. In fact, available data

suggests that O&G extraction declined from 1.5% of total Texas private sector employment in 1990 to 0.8% in 2000. As of 2013, private sector employment in O&G extraction was 1.1% of total private sector employment. In addition, in terms of MSAs only Midland, Odessa and Longview have more than 10% of employees working in the mining sector. In fact, 23% of mining employment is outside of the metropolitan areas, more than twice the industry average.

Table 1

Texas Energy-Intensive Industries Employment, Salaries, Wages & Establishments

	Employment			Average Annual Pay			Total Wages			Establishments		
	K	10-yr Chg(%)	Sh of TX	\$	10-yr Chg (%)	Sh of TX	Mil \$	10-yr Chg (%)	Sh of TX	#	10-yr Chg (%)	Sh of TX
Oil and Gas Extraction	104	64.5	52.8	174,892	54.5	1.15	18,158	154.1	59.8	4,384	35.7	44.9
Support Activities for Mining	176	146.2	43.2	91,349	55.7	1.11	16,036	283.3	46.9	5,131	90.6	29.1
Petroleum and Coal Products Mfg	25	4.9	22.4	128,248	54.4	1.24	3,210	62.0	26.2	266	3.1	11.2
Utilities	49	1.1	8.9	97,691	42.4	1.08	4,776	44.1	9.2	1,897	2.5	11.0
Nonmetallic Mineral Product Mfg	34	-21.2	9.1	51,959	36.4	1.06	1,759	7.5	9.2	1,143	-7.6	7.0
Chemical Mfg	75	-1.5	9.5	99,386	39.1	1.19	7,459	37.0	10.6	1,385	8.5	8.5
Air Transportation	60	-10.5	13.4	80,821	42.5	1.28	4,863	27.6	15.2	471	8.7	8.2

Source: BBVA Research, Haver Analytics & BLS

For wages, there has been a rapid rise in the share of wages paid to O&G and also the average annual pay. Higher demand for skilled workers, who are in low supply– STEM (Science, Technology, Engineering and Math) trained professionals– and growing importance of domestic energy production are causing O&G extraction wages to rise at a faster pace than other occupations. For example, in Texas, O&G extraction average salaries have grown 54.4% over the past ten years. This implies an average increase of 3.3% after controlling for inflation whereas over the same period, wages in the U.S. have only increased by 0.4%. As a result, higher wages are paid to O&G extraction employees in Texas than any other profession. In turn, support areas such as petroleum manufacturers, utility providers, chemical manufacturers and air and truck transportation that account for 11% of total employment in Texas are thriving. In fact, to quantify the knock on effects, incremental investment of \$500K in the mining sector creates one new job in energy-intensive industries.

Table 2

Top Texas Industry Employment, Salaries, Wages & Establishments

	Employment			Average Annual Pay			Total Wages			Establishments		
	K	10-yr Chg(%)	Sh of TX	\$	10-yr Chg (%)	Sh of TX	Mil \$	10-yr Chg (%)	Sh of TX	#	10-yr Chg (%)	Sh of TX
Oil and Gas Extraction	103.84	64.52	1.1	174,871	54.4	3.4	18,158	154.1	3.8	4,387	35.8	0.7
Offices Of Physicians	200.45	37.18	2.2	80,833	23.5	1.6	16,203	23.5	3.4	20,097	24.9	3.4
Support Activities for Mining	175.59	146.23	1.9	91,343	55.7	1.8	16,038	55.7	3.3	5,138	90.9	0.9
General Medical & Surgical Hospitals	280.02	16.64	3.0	56,126	43.1	1.1	15,716	43.1	3.3	529	23.4	0.1
Architectural & Eng Services	150.51	34.37	1.6	91,651	50.0	1.8	13,794	50.0	2.9	9,938	16.9	1.7
Computer & Systems Design Services	133.54	91.91	1.4	97,253	24.6	1.9	12,987	24.6	2.7	15,914	93.2	2.7
Management of Companies & Enterprises	89.96	119.22	1.0	114,217	78.0	2.2	10,275	78.0	2.1	2,511	81.8	0.4
Depository Credit Intermediation	156.52	24.90	1.7	60,739	45.7	1.2	9,507	45.7	2.0	7,316	37.3	1.2
Bus. & Technical Consulting Services	106.01	107.27	1.1	88,090	33.2	1.7	9,338	33.2	1.9	16,967	92.9	2.9
Building Equipment Contractors	158.43	13.68	1.7	51,694	41.8	1.0	8,190	41.8	1.7	12,679	12.3	2.1

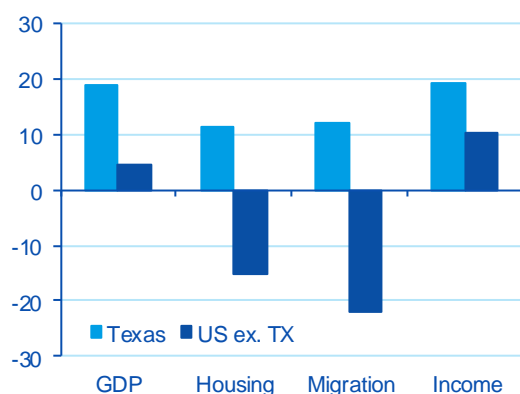
Source: BBVA Research, Haver Analytics & BLS

Although break even prices in the Texas tend to be lower than other major producers, for there to be a significant reduction in employment and wages in Texas oil prices would have to be a prolonged drop below \$70/bbl. According to ITG, 15 of the largest shale plays in the country are above breakeven with oil prices below \$80 /bbl. If prices drop below \$70 /bbl only 9 of the 15 shale plays remain above breakeven. However, five of the major shale formations that remain above breakeven at \$80 /bbl are in Texas: Eagle Ford, Barnett Combo,

Midland Basin, Yeso and Delaware Basin. As a result, prices will likely have to settle around between \$70 /bbl - \$80 / bbl for investment to continue at its current pace. Even still, more experienced companies could have significantly lower breakeven prices even when drilling in similar fields than companies with less experience. Moreover, accelerated technological breakthroughs could imply that within a short period of time, companies could reap similar rates of returns after oil prices decline.

Chart 11

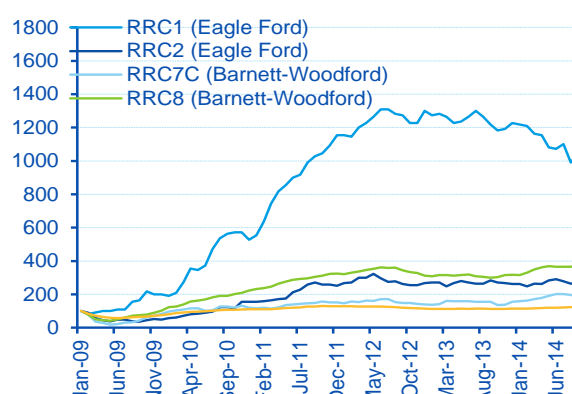
Texas Recovery vs. U.S. (PP)



Source: BBVA Research, Haver Analytics, Census, B.E.A & FHFA

Chart 12

Texas Rig Count Index by Rail District (2009=100)



Source: BBVA Research, Haver Analytics, OGJ & Texas Rail Road Commission

Table 3

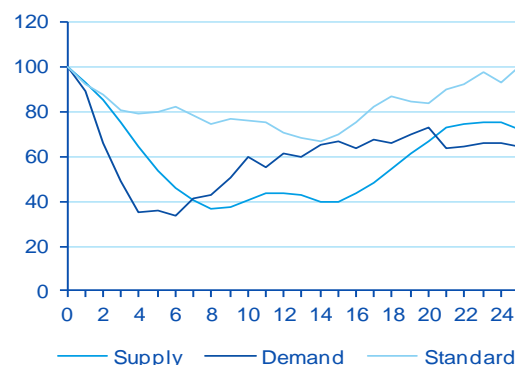
MSA Industry Concentration Rank

	NAICS	Share of Emp (%)	Rank
Elkhart-Goshen, IN	Manufacturing (31-32)	38.20%	1
Rochester, MN	Health (62)	31.41%	2
Columbus, IN	Manufacturing (31-32)	31.01%	3
Dalton, GA	Manufacturing (31-32)	28.84%	4
Atlantic City, NJ	Accommodation (72)	27.06%	5
Sheboygan, WI	Manufacturing (31-32)	26.92%	6
Midland, TX	Mining (11)	25.04%	7
Oshkosh-Neenah, WI	Manufacturing (31-32)	23.53%	8
Las Vegas, NV	Accommodation (72)	22.75%	9
Kahului, HI	Accommodation (72)	21.61%	10
New York, NY	Finance (52)	8.38%	983
Dallas-Fort Worth, TX	Finance (52)	8.16%	1014
Los Angeles, CA	Information(51)	3.57%	3504
Houston, TX	Mining (11)	3.50%	3555

Source: BBVA Research & B.E.A

Chart 13

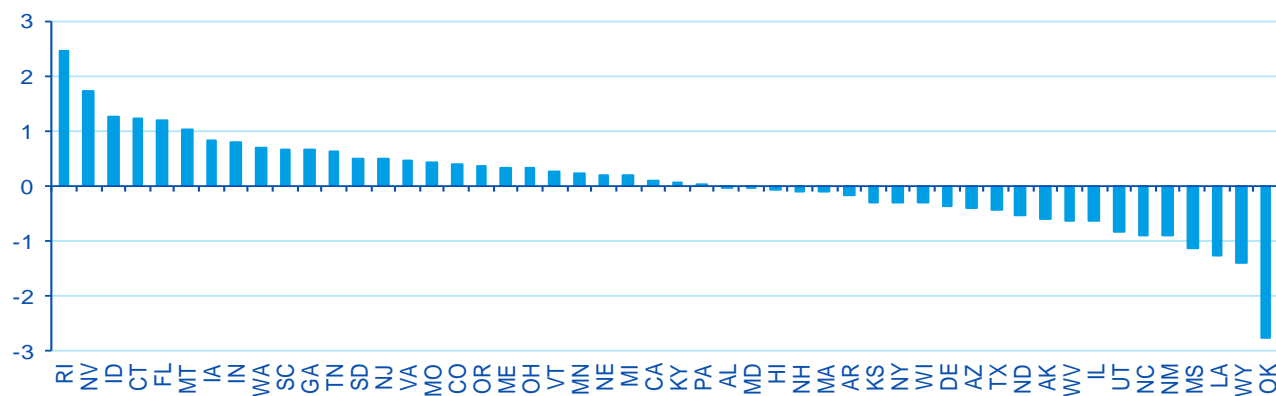
Oil Price Scenario Index (WTI)



Source: BBVA Research
* Periods in Months

For a handful of states, the impact from lower oil prices could be a non-trivial increase in economic activity. For example, states such as Florida and Nevada that rely heavily on energy-intensive industries could grow by an additional 1.4pp and 1.3pp of GDP for every 10% decrease in oil prices. In addition, states that rely on manufacturing activity such as Indiana, Minnesota and Ohio would also benefit and could see GDP increase by 88bp, 80bp, 68bp for every 10% decline in oil prices. However, it is important to keep in mind that the benefits from declining prices would likely be offset by the negative economic headwinds if prices declined too rapidly or if the underlying cause of the drop was a slowdown in global economic activity.

Chart 14

Impact of 10% Oil Price Decline on State Employment (PP)

Source: BBVA Research & Haver Analytics

Nevertheless, if prices continue to trend downwards and decline to a level that would induce a shift in expectations, cash flows and spending plans, there would likely be a correction in activity negatively impacting Texas' potential for growth. In what follows we present results of an impact study of what oil price declines imply for the Texas economy. For simplicity, we present three distinct oil price scenarios. These scenarios are distinct in their duration, impetus and severity but all simulate negative price shocks. In the "*standard*" scenario, we model what equates to a standard 3-month decline in oil prices— 21.8% decline over 1 quarter. In the "*supply-side*" scenario, the assumptions are motivated by a supply-side shock similar to those experienced in the 70s and 80s that were driven by geopolitical instability and supply side corrections. In the "*demand-side*" scenario, the shock is motivated by a demand driven decline, similar to the 2008 price shock.

We find that under the *standard* scenario the Texas economy could lose 1.3pp in growth relative to our baseline. In the *supply-side* scenario, our estimates suggest Texas would lose 3.4pp relative to our baseline. In the *demand-side* scenario, Texas GDP would be 4.3pp below the baseline. The impact that these shocks would have on MSA growth varies from Midland where losses could exceed 1/4th of all economic activity to Dallas which would see little to no impact from the decline.

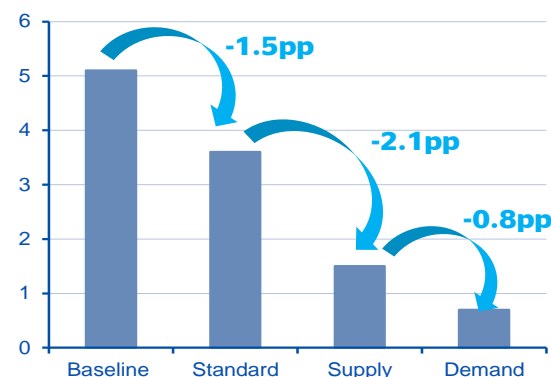
Economic Headwinds Unavoidable for Texas in All Three Scenarios

Table 4
Implied Texas GDP Growth w/ Oil Price Shocks

	Standard-Scenario		Supply-Side Scenario		Demand-Side Scenario	
	Median	Tail Risk	Median	Tail Risk	Median	Tail Risk
2015 Baseline GDP*	1.53	1.53	1.53	1.53	1.53	1.53
Ex-Post 2015 GDP	1.47	1.46	1.48	1.47	1.51	1.51
Baseline Texas Growth (%)	4.90	4.90	4.90	4.90	4.90	4.90
Ex-post Texas Growth (%)	0.65	0.00	1.50	0.97	3.61	3.81
Net Impact (PP)	-4.25	-4.90	-3.40	-3.93	-1.29	-1.09

Source: BBVA Research & B.E.A
* GDP in Trillions 2009\$, PP

Chart 15
Implied Texas GDP Growth w/ Oil Price Shocks



Source: BBVA Research

To quantify the impact that a decline in oil prices would have on the Texas economy, we use 2-stage estimation. For the first stage, we estimate the impact that price changes have on real activity—rig activity—and in the second stage, what changes in real activity imply for Texas' mining employment. Assuming prices influence mining employment through changes in rig activity should produce unbiased and consistent results. For the broader Texas economy, reductions in mining sector employment are carried through rest of the economy, which gives an economy-wide picture of how Texas economic activity would respond to three distinct oil prices scenarios.

Standard Scenario

In the *standard* scenario, mining employment declines by 26.8K or 9% of total mining employment. This implies a direct real economic loss of \$11bn. In terms of wages the decline in real-value added translates to \$2.0bn in lost wages. Lower consumption amongst a non-trivial share of high skilled workers weighs on total wages, reducing state wide income by \$3.9bn.

Unlike the other scenarios which inflict hardship on state finances, losses in state revenues are small, and only account for 2.5% of total revenue. The \$1.1bn in lost revenue is largely due to declines in oil production. Assuming little to no downside risk to natural gas prices implies only a small decline in natural gas revenue.

In total, a 20% reduction in prices would reduce employment by 150K, GDP by \$18.8bn in direct losses plus indirect effects, and overall growth by 1.3pp. Although diminutive when compared to the losses in the other two scenarios, the shock would pull down GDP from our baseline forecast of 4.9% to 3.6% in 2015. However, to keep this in perspective, this risk scenario would imply that Texas would still have the 4th highest growth rate among the remaining 49 states in our 2015 baseline.

Supply-side

Under the *supply-side* scenario, in which peak oil price declines reach 60%, mining sector employment declines by 69K jobs or \$29bn in terms of lost value added. In fact, lower mining sector employment reduces overall mining wages by 15.2%. Total losses are less severe and only decline by 2.2% statewide.

Lower business confidence, weaker labor market expectations and lower consumer demand also weigh on state revenue collection in this scenario. In total, Texas could lose \$3.1bn, of which 85% is due to lower revenues from natural gas and oil production

Total losses in the *supply-side* scenario are 400K jobs, with the highest concentrations in energy intensive industries and transportation. The rapid deterioration in economic conditions would push Texas GDP 3.4pp below our 2015 baseline.

Demand-side

Under *demand-side* scenario, the mining sector loses 30% of the mining employment, or 90K employees. This would result in direct real value-added losses of \$36bn. In addition, mining sector wages are acutely impacted. The anticipated deterioration in labor markets conditions would lead to 19.0% decline in wages or \$6.6bn from current levels. In addition, the private sector in Texas experiences direct losses of \$13.1bn before incorporating secondary and induced effects.

The fiscal shock in the *demand-side* scenario will also impact state revenues. In total, losses could exceed \$5.3bn, of which 80% are due to lower revenues from natural gas and oil production.

The *demand-side* scenario, which represents a near worst case idiosyncratic shock, causes total job losses of 500K jobs of the 11.6M full-time or part-time workers in Texas, which amounts to 4.3% of employed persons. The near historic economic conditions would push Texas GDP 4.3pp below our 2015 baseline and would likely push Texas to the brink of recession. However, despite the major job and income losses, Texas would likely avoid having its worst recession in modern history (-2.2%, 1986), and would likely face conditions milder than those experienced by states such as Nevada and Arizona during the great recession.

Don't Sell The Farm: Housing Sectors Less Vulnerable To Oil Price Shock

Table 5

Total Economic Impacts from Oil Price Shocks (%)

	Employment	Income	Home Prices	Oil Revenues	Credit
Standard Scenario	-1.3	-0.8	-0.05	-23.1	-1.3
Supply-Side Scenario	-3.4	-2.2	-0.14	-61.0	-3.3
Demand-Side Scenario	-4.3	-2.7	-0.15	-76.0	-4.2

Source: BBVA Research

*All values expressed as percent decline from current level

To the upside, that banking system remains resilient under all three scenarios. In fact, in the most severe scenario—demand side scenario— peak loan losses are only a small fraction of total loans in the state. In terms of the category specific shocks, C&I and residential secured loans experience the largest losses while CRE and other consumer loans remain largely unaffected. Because a majority of the shock is confined to the mining sector, it is not surprising that CRE and other consumer loans that depend more on general macroeconomic conditions are not significantly impacted.

Buoying the credit sector is the muted response from the residential housing market in all three scenarios. In fact, our estimates suggest that for every one percent decline in employment excluding the mining sector homes prices will decline by 20bp in the worst-case scenario. As a result, prices decline in the *demand-side* scenario by 1.2%, all else equal. This is a modest decline relative to 2008. For example, the five states that experienced the largest declines in home prices during the housing crisis— Nevada, Florida, Arizona, California and Rhode

Island— had peak losses that exceeded 50% on average. However, during the last crisis that coincided with the a largest historic drop in oil prices Texas home prices never declined below 2006 peak prices and only experienced moderate declines from one quarter to the next. This supports our findings for a less severe decline in home prices relative to other indicators. Yet, the disproportionate decline in wages in mining sector and the strong relationship of home prices and wages and incomes suggests there could be indirect effects and idiosyncratic risks that could imply far greater losses in housing. Nonetheless it is important understand that the national housing crisis was tied to a prolonged housing bubble dependent on subprime loans and high leverage ratios, financed by global savings.

Economic Activity a Mixed-Bag for Texas MSAs

Table 6

Economic Impacts from Oil Price Shocks for Texas MSAs (%)

	Standard Scenario			Supply-Side Scenario			Demand-Side Scenario		
	GDP	Home Prices	Income	GDP	Home Prices	Income	GDP	Home Prices	Income
Abilene	-1.5	-1.0	-0.9	-4.0	-2.5	-2.4	-5.0	-3.1	-3.0
Amarillo	-0.4	0.5	-0.8	-1.1	1.2	-2.1	-1.3	1.5	-2.7
Austin-Round Rock	0.6	0.0	0.9	1.5	0.0	2.3	1.9	0.0	2.9
Beaumont	-0.5	-0.6	-1.1	-1.3	-1.5	-2.8	-1.7	-1.8	-3.5
Brownsville	1.0	0.1	0.5	2.7	0.3	1.3	3.4	0.4	1.6
College Station	-0.1	-0.3	-0.3	-0.2	-0.7	-0.9	-0.2	-0.8	-1.1
Corpus Christi	-0.6	-0.4	-1.1	-1.6	-1.0	-2.8	-2.0	-1.2	-3.5
Dallas-Fort Worth	0.8	0.3	-0.4	2.0	0.7	-1.0	2.5	0.8	-1.2
El Paso	0.1	-1.5	-0.2	0.2	-4.0	-0.5	0.2	-5.0	-0.6
Houston	-0.7	0.2	-1.8	-1.8	0.6	-4.6	-2.2	0.7	-5.8
Killeen	-0.8	-0.4	0.9	-2.0	-1.0	2.3	-2.5	-1.3	2.9
Laredo	-0.1	-1.9	-0.4	-0.4	-5.0	-1.1	-0.5	-6.2	-1.4
Longview	-0.6	-0.6	-2.1	-1.5	-1.7	-5.5	-1.9	-2.1	-6.9
Lubbock	0.6	0.3	-0.2	1.6	0.8	-0.6	2.0	0.9	-0.7
McAllen-Edinburg	-0.4	0.0	0.2	-0.9	0.0	0.4	-1.2	0.0	0.5
Midland	-4.9	-4.7	-7.9	-12.9	-12.2	-20.7	-16.1	-15.3	-25.8
Odessa	-1.2	-1.5	-4.7	-3.1	-3.9	-12.3	-3.8	-4.8	-15.4
San Angelo	-0.9	-0.6	-1.1	-2.4	-1.6	-2.8	-3.0	-2.0	-3.5
San Antonio	0.1	-0.5	-0.2	0.2	-1.4	-0.4	0.3	-1.8	-0.5
Sherman	-0.2	-0.1	-0.2	-0.5	-0.2	-0.5	-0.6	-0.3	-0.6
Texarkana	0.3	-0.4	-0.2	0.7	-1.1	-0.6	0.9	-1.3	-0.7
Tyler	-0.8	-0.3	-1.2	-2.0	-0.7	-3.2	-2.5	-0.9	-4.0
Victoria	0.2	-1.3	-1.0	0.4	-3.4	-2.7	0.5	-4.3	-3.4
Waco	0.7	0.4	0.4	2.0	1.2	1.1	2.5	1.4	1.3
Wichita Falls	-1.4	0.0	-1.4	-3.7	0.0	-3.8	-4.7	0.0	-4.7

Source: BBVA Research

*All values expressed as percent decline from current level

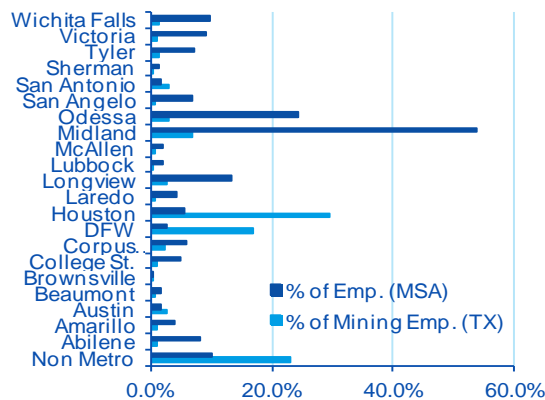
Diversification towards other high-value added sectors such as healthcare (Texas Medical Center- Houston), technology and R&D (Silicon Hills-Austin, Telecom Corridor/Silicon Prairie-Richardson), greater energy substitution, and closer relationships to U.S. business cycles for some major MSAs suggests only a mild impact from oil price declines. For others, our estimates suggest significant economic losses. Specifically, MSAs in the central and western portion of Texas that have higher concentrations of drilling activity and are less diversified are vulnerable to oil prices shocks.

Despite bordering the Midland Basin region, which has been an area with high levels of drilling activity and favorable breakeven prices (\$59/bbl), Midland would likely be the most at risk of severe economic contraction because of its staggering reliance on the energy sector. In fact, 25% of Midland's employed persons work in the mining sector, which ranks as the seventh highest concentration in the country. Moreover, 50% of economic

activity in Midland is directly related to mining sector. As a result, in the demand-side scenario, 14.9K jobs would be lost. In addition, GDP would be 17.5pp lower than our current baseline, which implies a -9.0% GDP growth rate in 2015. In 2002 and 2009, real GDP declined 11% and 15%, respectively. Due to high exposure to mining sector in Midland, the housing sector suffers cumulative losses in home prices of 15.3%, 12.2% and 4.7% in the standard, supply-side and demand-side scenario, respectively.

Chart 16

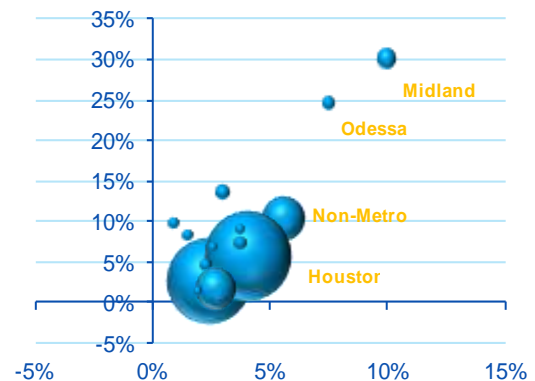
MSA Mining Employment Concentration & Share of State Mining Employment



Source: BBVA Research, Haver Analytics & B.E.A

Chart 17

MSA Mining Employment Concentration & 5-Year Average GDP Growth (%)



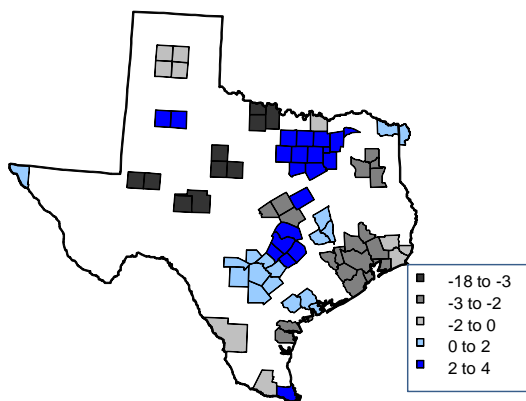
Source: BBVA Research, Haver Analytics & B.E.A

*Weights=GDP

Similar to Midland, Odessa, Abilene, Victoria, Wichita Falls and Longview would be disproportionately impacted by an oil price shock. In fact, over the past three years, due to the boom in O&G exploration these MSAs have grown by 5.5bn in real terms, which increased the size of these economies by 22%. However, in a severely adverse scenario nearly 1/4th of the accumulated growth over the past 3 years is wiped out, and Abilene and Wichita Falls would likely trend towards recession.

Map 1

Impact of Demand-Side Scenario on GDP (%)*



Source: BBVA Research, Haver Analytics & B.E.A

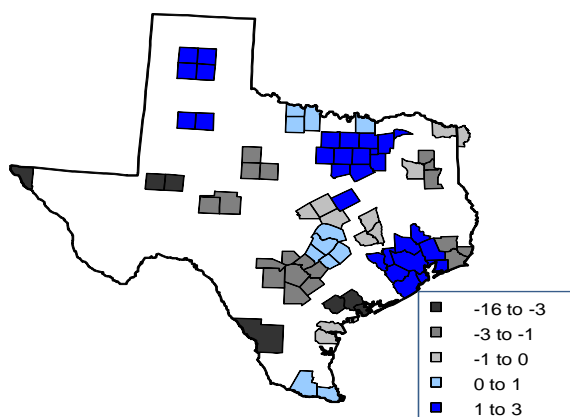
*Percent decline from current level

For Houston, the energy capital of the U.S., which has the largest number of mining sector employees and is 1/3rd of the Texas' economy, the outlook is less dire. While it is obvious that a decline in oil prices will negatively impact Houston's economy, our estimates suggests a moderate-to-mild impact. In fact, in the more severe demand-side scenario, growth is pulled 2.3pp below our baseline. In spite of losing nearly 34.9K in the mining sector jobs, home prices also remain largely unaffected by the direct impact from the mining sector. This could be explained from the fact that large O&G companies can offset losses from drilling and exploration activities with refining, since oil prices act as a boost to this sector. In addition, as a share of employment, the mining sector only accounts for 3.5% of all employees and in fact is only 2.0% of the total population.

For Dallas-Fort Worth, Austin, San Antonio and El Paso, the outlook is slightly more optimistic. In fact, none of the MSAs show a significantly positive relationship with oil prices and O&G extraction activity. In part, this may reflect that some industries such as manufacturing benefit from lower energy prices. Thus, growth in the low energy-intensive MSAs would likely be more dependent on U.S. and global business cycles. However, if the decline in oil prices is caused by lower growth and demand from abroad that fails to boost domestic activity outside of Texas, growth in these MSAs could decelerate or decline.

Map 2

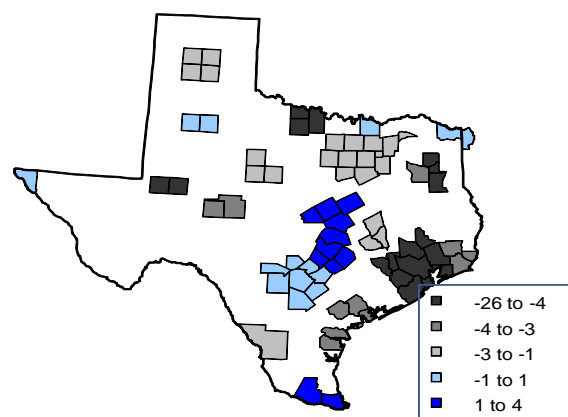
Impact of Demand-Side Scenario on Home Prices (%)*



Source: BBVA Research, Haver Analytics & FHFA
*Percent decline from current level

Map 3

Impact of Demand-Side Scenario on Texas Income (%)*



Source: BBVA Research, Haver Analytics & B.E.A
*Percent decline from current level

Bottom Line

The boom in horizontal drilling and hydraulic fracturing in recent years has increased the importance of mining across the U.S. and any sharp oil price decline will reduce the windfall gains in this sector. In fact, our analysis confirms that oil price declines will negatively affect Texas' economy. This is evident when looking at the impact at the MSA level. However, the net impact for Texas may not be as strong as in the past, as the largest MSA appear less dependent on O&G. In other words, our analysis confirms a high level of success in the efforts that followed the 1980s crisis to increase economic diversification and reduce the probability of experiencing another devastating shock that came from falling oil prices. Despite the obvious downside to lower oil prices in Texas, our estimates also suggest that a handful of states may benefit from lower oil prices and experience a non-trivial increase in activity with measured price declines.

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