Keeping it Together!!

Preserving the Permian Basin Energy Sector and the Odessa Economy through the COVID-19 and Related Oil Market Challenges

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Executive Summary

- The Permian Basin is among the most important oil-producing regions in the world. Drilling and production and the necessary supporting industries generate business activity not only in the region, but across the state and the nation. In order to be in a position to fully take advantage of future opportunities, it is imperative that the underlying capabilities remain in place – the workforce, the infrastructure, the supply chain, the equipment, and the community support systems. Given the current situation, maintaining this viability requires immediate action from governments at all levels and the private sector.

- The Perryman Group estimates that under normal market conditions such as those prevailing in 2019, the total economic benefits to Texas associated with oil and gas activity in the Permian Basin are estimated to include over $163.8 billion in gross product each year and almost 1.4 million jobs. These amounts represent about 10% of the Texas economy. For the US, oil and gas activity in the Permian Basin leads to economic benefits of an estimated $187.2 billion in gross product each year and more than 1.5 million jobs.

- In addition to the sheer magnitude of these economic benefits, the oil and gas produced in the Permian Basin are also important to achieving major US policy goals, such as energy security and reducing the deficit in the balance of trade.

- The Permian Basin also contributes billions in tax revenue to State and local taxing entities as well as the federal government through severance taxes paid on production and the increased taxes associated with the total economic benefits measured in the course of this study.
    - In fiscal 2019, severance taxes to the State of Texas on Permian Basin production totaled an estimated $3.3 billion, with approximately $16.3 billion over the past 10 fiscal years.
    - Total fiscal benefits through 2030 of additional business activity associated with Permian Basin production and severance taxes are estimated to include $118.9 billion to the State, $88.2 billion to local government entities across Texas, and $456.0 billion to the federal government under baseline oil price assumptions.

- Drastic, but necessary, measures to "flatten the curve" and prevent a major spike in COVID-19 infections have involved shutting down much of the economy. The inevitable result has been the loss of millions of jobs and a sudden and unprecedented downturn throughout the country and, indeed, the entire world. The Perryman Group's most recent projections incorporate the potential effects of COVID-19.
    - The US forecast calls for significant losses this year of an estimated 9.8 million jobs and $1.0 trillion in output (real gross domestic product) relative to 2019. However, a fairly rapid recovery is expected once the worst virus issues have passed.
    - For Texas, the negative effects of COVID-19 have been compounded by turmoil in energy markets. The Perryman Group's forecast for Texas indicates losses this year of a projected 861,000 jobs (a 6.48% decrease) and $133.8 billion in output (down 7.6%). On a relative basis, these losses exceed those for the nation as a whole.
    - The rapid decline in energy demand has magnified the effects of COVID-19 in the Permian Basin, and The Perryman Group's forecast indicates losses of $14.1 billion in output and 35,900 jobs in 2020
    - The forecast for the Odessa metropolitan area calls for significant losses this year of an estimated 10,400 jobs and $1.5 billion in output (real gross domestic product) on an annualized basis relative to 2019, with substantially higher losses over the next few months.

- Supporting the structure of the energy sector in the Permian Basin through the current challenges can help ensure that it is in place and ready to resume production growth once the COVID-19 and oil market oversupply conditions are moderated.

- The Perryman Group's assessment of the situation in Odessa indicates that the following actions should be taken, supported, and/or continued.
    - utilize a task force of public-sector and private-sector community and business leaders,
    - support grant and loan programs to affected businesses,
    - provide assistance to local families,
    - establish a clearinghouse for information related to available assistance and utilize available planning resources,

  - engage in an information campaign to communicate to the community how the current downturn is different from others such as the 1980s,
  - seek to provide universal broadband availability across the area, and
  - engage in a marketing and advocacy campaign to inform State and federal leaders and major private-sector constituencies of the importance of the Permian Basin.

- An aggressive and focused response is imperative to both maintain the infrastructure of the local sector and secure the full potential of Odessa and the entire Permian Basin as the epicenter of efforts to meet future global energy needs.

Introduction

The Permian Basin is among the most important oil-producing regions in the world. Drilling and production and the necessary supporting industries generate business activity not only in the region, but across the state and the nation. This economic activity leads to substantial taxes to the Federal, State, and local governments. Billions in severance taxes on Permian Basin production are paid to the State every year. The benefits of energy security to the US are enormous, as are the improvements in the trade balance fostered by energy exports.

Drilling and production and the necessary supporting industries generate business activity not only in the region, but across the state and the nation. This economic activity leads to substantial taxes to the State and local governments.

The Permian Basin is the epicenter of the recent progress and future prospects in these arenas, being responsible for about two-thirds of incremental domestic production in the past decade. An economic and technological revolution of global significance has surfaced in oil and gas production in recent years and continues into a phase characterized by major increases in efficiency and associated cost reductions. Maintaining this source of notable stimulus and competitive advantage is of paramount importance.

In recent weeks, the remarkable success of the regional economy has been abruptly interrupted by the COVID-19 pandemic. Like many places around the globe, the area has been subject to the dislocations associated with social distancing and business closures required to combat the virus. In addition, the situation created an unprecedented reduction of about 25% in global energy demand in a matter of weeks. When coupled with increasing production and threats of even more among many of the world's leading producers, a drastic market collapse occurred, leaving economic disruptions throughout the Permian Basin in its wake.

The Perryman Group (TPG) was recently asked to (1) examine the importance of the Permian Basin to the US and Texas economies, (2) assess the current problems occurring in the region, and (3) identify the key areas in which remediation is required and offer recommendations. This report and its Appendices present the results of TPG's analysis.

The Permian Basin's Challenge

As noted, oil prices began to fall precipitously earlier this year due to the novel coronavirus and the effects of virus-related disruptions on demand for crude oil. The quantity of oil purchased in the market plummeted as the effects of the virus spread across the world, falling by more than 20% in March alone. This unprecedented, albeit temporary, "demand shock," in and of itself, would have (and initially did) put enormous downward pressure on oil prices.

In the midst of the virus pandemic, talks among major global oil producers to try to bring discipline to the market collapsed. The decision by the Saudi Arabian government to engage in what was essentially a price war with Russia (after that country refused to endorse proposed production cuts) caused oil prices to fall sharply due to the potential for dramatically increased crude oil production. Several other large producers also signaled higher output. The result was a massive "supply shock" at a time of rapidly declining demand.

Neither Russia (because of inefficiencies in its production) nor Saudi Arabia (because of the social spending that is tied to oil production) could sustain low prices indefinitely, and the recent agreement to decrease production should bring some relief over time. Even so, prices currently remain low and have even recently gone decidedly negative for certain futures contracts, and the US industry is struggling, particularly smaller and mid-sized firms, as credit dries up and profits vanish.

Although production costs are down sharply in Texas in recent years, they are not yet at a level to maintain viability at prices in the $20s per barrel. As a result, the current situation is leading to significant dislocations in the Permian Basin economy, as well as the state as a whole. The industry is engaged in a rapid shutdown of drilling activity, which ripples through an enormous supply chain and supporting retail and service enterprises in the affected communities. Banks which have large energy company loan portfolios are being strained, and mid-stream and downstream investments are being deferred. Adverse effects on oil producing areas and those supporting the industry, including Odessa and the rest of the Permian Basin, are being observed in a dramatic fashion.

The current situation is devastating, but temporary. The fundamental economic forces that were driving oil production to record levels have been paused, but they remain in place.

The current situation is devastating, but temporary. The fundamental economic forces that were driving oil production to record levels have been paused, but they remain in place. While there is no doubt that the world will look different going forward and certain protocols and practices will change, there is nothing to suggest that the overall level of future global production will be compromised. The emerging segments of the world economy will continue to expand rapidly once the virus subsides and will require enormous energy supplies. The Permian Basin resources will be essential to meeting these needs.

To be in a position to fully take advantage of the Permian Basin's resources, it is imperative that the underlying capabilities remain in place – the workforce, the infrastructure, the supply chain, the equipment, and the community support systems. Given the current situation, maintaining this viability requires immediate action from governments at all levels and the private sector.

To be in a position to fully take advantage of this opportunity, however, it is imperative that the underlying capabilities remain in place – the workforce, the infrastructure, the supply chain, the equipment, and the community support systems. Given the current situation, maintaining this viability requires immediate action from governments at all levels and the private sector. It is also important that the area continue efforts to deal with education, infrastructure, and other issues required to support long-term expansion. While it is natural and appropriate for these initiatives to be paused at present, they are vital for long-term success. Such efforts will ultimately require substantial external resources and support. Thus, assuring that stakeholders beyond the area fully understand the importance of the Permian Basin to both the US and Texas is essential. At present, the need for effective and immediate intervention is crucial for Odessa, as the key service hub of the oil and gas sector and a major population center, as well as for the entire region. Unfortunately, the current situation also brings declining fiscal revenues for local taxing authorities, but a substantive response is nonetheless imperative.

The Importance of the Permian Basin to the Texas and US Economies

The oil and gas sector in Texas has one of the highest regional jobs multipliers in the country, impacting not only producing areas, but also other parts of the state. In order to provide a complete understanding of the importance of the Permian Basin to the Texas and national economies, The Perryman Group estimated the direct economic stimulus associated with drilling and production activity, related services firms, associated pipeline investments and operations, and the petrochemical complex along the Texas Gulf Coast including refineries, chemical plants, and LNG facilities and port activity which rely on Permian Basin production as an essential input. Estimates of direct effects of the Permian Basin were then used as inputs to the impact assessment system to estimate the total economic impact of the Permian Basin on the US and Texas economies. These effects are measured based on the period preceding the COVID-19 outbreak, in order to provide a "typical" illustration of the economic significance of the region.

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The Perryman Group also measured economic, fiscal, and other effects through 2030 under four oil price scenarios. According to The Perryman Group's assessment, the most likely case (with a 40% probability going forward) is one in which prices are in the $55-$65 per barrel range on average through 2030 (Baseline assumptions). The High case (prices above $70 on average) is somewhat more likely than the Low case (prices in the $45-$55 range), with 30% and 25% probabilities, respectively. The Very Low case, where prices average $25-$35 on average through 2030, is unlikely (5% probability) based on current information. In fact, given global production costs and fiscal break-even levels, it is doubtful that prices at this level over an extended period could support and sustain required levels of supply to meet market requirements.

A brief overview of methods used and definitions of terms is located on the following page, with additional detail in Appendix A and results by industry in Appendix B.

Measuring Economic Impacts

The extraction, transportation, and processing of oil and gas produced in the Permian Basin lead to substantial business activity. Any economic stimulus, whether positive or negative, generates multiplier effects throughout the economy. The Perryman Group's input-output assessment system (the US Multi-Regional Impact Assessment System, which is described in further detail in the Appendices to this report) was developed by the firm about 40 years ago and has been consistently maintained and updated since that time. The model has been used in hundreds of analyses for clients ranging from major corporations to government agencies and has been peer reviewed on multiple occasions. The impact system uses a variety of data (from surveys, industry information, and other sources) to describe the various goods and services (known as resources or inputs) required to produce another good/service. This process allows for estimation of total economic impacts (including multiplier effects). The models used in the current analysis reflect the specific industrial composition and characteristics of the study areas.

Total economic effects are quantified for key measures of business activity:

Total expenditures (or total spending) measure the dollars changing hands as a result of the economic stimulus.
Gross product (or output) is production of goods and services that will come about in each area as a result of the activity. This measure is parallel to the gross domestic product numbers commonly reported by various media outlets and is a subset of total expenditures.
Personal income is dollars that end up in the hands of people in the area; the vast majority of this aggregate derives from the earnings of employees, but payments such as interest and rents are also included.
Job gains are expressed as (1) full-time equivalent jobs for effects which are expected to be ongoing or (2) job-years of employment for cumulative measures. A job-year is one person working for one year, though it could be multiple persons working partial years.

Monetary values were quantified on a constant (2020) basis to eliminate the effects of inflation. See Appendix A for additional information regarding the methods and assumptions used in this analysis and Appendix B for results by industry.

Texas

With significant oil production for more than a century, Texas has developed most aspects of the energy industry supply chain, and therefore the ripple effects are particularly large. The Perryman Group estimates that under normal market conditions such as those prevailing in 2019, the total economic benefits to Texas associated with oil and gas activity in the Permian Basin are estimated to include over $163.8 billion in gross product each year and almost 1.4 million jobs. These amounts represent about 10% of the Texas economy. Effects by industry segment are noted in the table below.

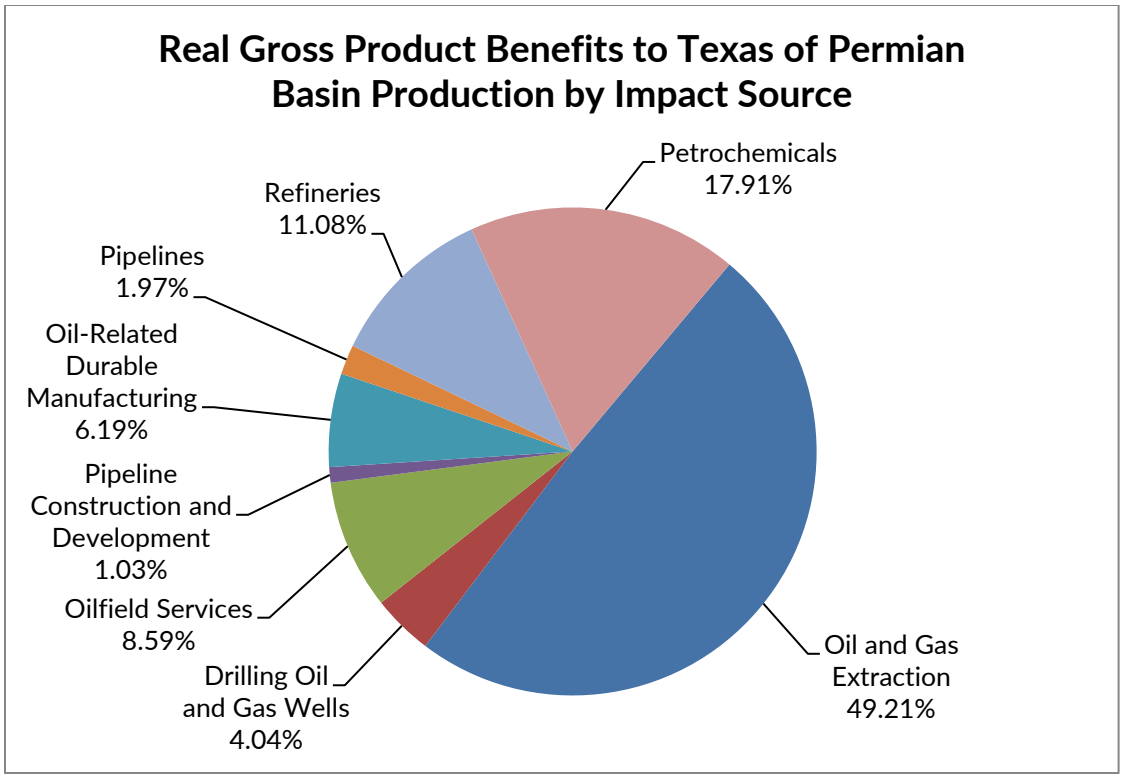
The total economic benefits to Texas associated with activity in the Permian Basin are estimated to include over $163.8 billion in gross product each year and almost 1.4 million jobs.

The Annual Impact of Permian Basin Oil Production on the Texas Economy

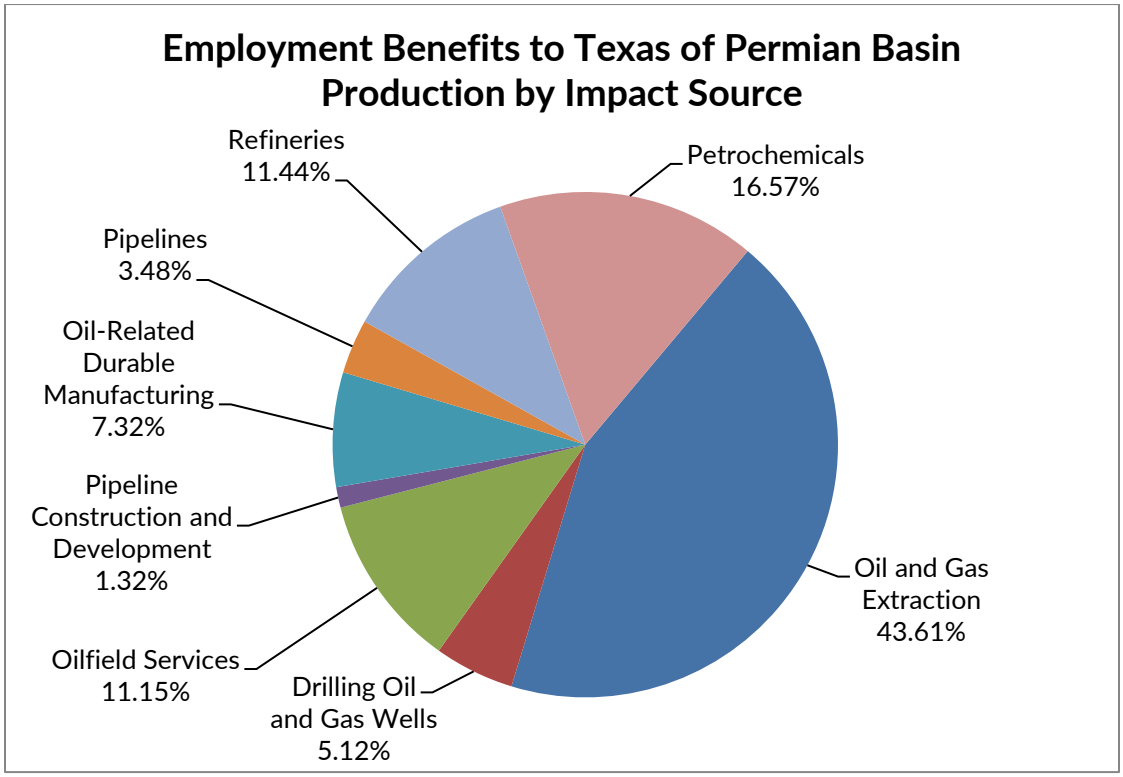
	Expenditures (Billions of 2020 Dollars)	**Gross Product** (Billions of 2020 Dollars)	**Personal Income** (Billions of 2020 Dollars)	**Employment** (Jobs)
Oil and Gas Extraction	$237.285 b	$80.616 b	$32.011 b	603,414
Drilling Oil and Gas Wells	$14.633 b	$6.614 b	$4.473 b	70,816
Oilfield Services	$28.665 b	$14.073 b	$9.691 b	154,295
Pipeline Construction and Development	$3.541 b	$1.680 b	$1.151 b	18,237
Oil-Related Durable Manufacturing	$23.464 b	$10.134 b	$6.512 b	101,231
Pipelines	$9.556 b	$3.221 b	$2.028 b	48,091
Refineries	$77.030 b	$18.148 b	$10.273 b	158,328
Petrochemicals	$73.598 b	$29.333 b	$16.341 b	229,281
TOTAL	**$467.771 b**	**$163.817 b**	**$82.480 b**	**1,383,693**

Note: Based on The Perryman Group's estimates of activity by segment of the energy industry and associated multiplier effects in 2019 to provide a snapshot of the importance of the industry based on known information.
Source: The Perryman Group

About 49.2% of the benefits as measured by real gross product are related to oil and gas extraction, with another 17.9% associated with petrochemicals.



The same sectors, oil and gas extraction and petrochemicals, lead to the largest components of the employment benefits associated with the energy sectors.



These effects vary notably depending on the level of oil prices and corresponding production, with Texas gross product benefits associated with Permian Basin production ranging from $104.0 billion under Very Low price assumptions to $303.8 billion per year if prices are high. Employment estimates range from 777,190 job-years to 2,269,933 job-year depending on price levels assumed. The estimates below reflect a "typical" future year based on alternative market conditions.

Total Impact of Permian Basin Oil Production on the Texas Economy in a "Typical" Year through 2030 Under Various Oil Price Assumptions

	Gross Product (Billions of 2020 Dollars)	**Employment** (job years)
Baseline Assumptions: 40% Probability ($55-$65 per barrel range on average)	$224.4 b	1,677,058
Low Price Assumptions: 25% Probability ($45-$55 per barrel range on average)	$190.7 b	1,424,992
High Price Assumptions: 30% Probability (above $70 on average)	$303.8 b	2,269,933
Very Low Price Assumptions: 5% Probability ($25-$35 per barrel range on average)	$104.0 b	777,190

Note: Based on The Perryman Group's estimates of stabilized production levels through 2030 under various oil price scenarios and the resulting economic impacts. Dollar amounts in constant 2020 dollars to eliminate the effects of inflation. A job-year is equivalent to one person working for one year, though it could be multiple individuals working partial years.
Source: The Perryman Group

Results for other measures of business activity are presented in Appendix B.

United States

The impact of Permian Basin production on the US includes not only effects in Texas, but also spillover to other states. The Perryman Group estimates that under normal market conditions as observed in 2019, the total economic benefits to the United States associated with oil and gas activity in the Permian Basin are estimated to include almost $187.2 billion in gross product each year and more than 1.5 million jobs. Effects by industry segment are noted in the following table.

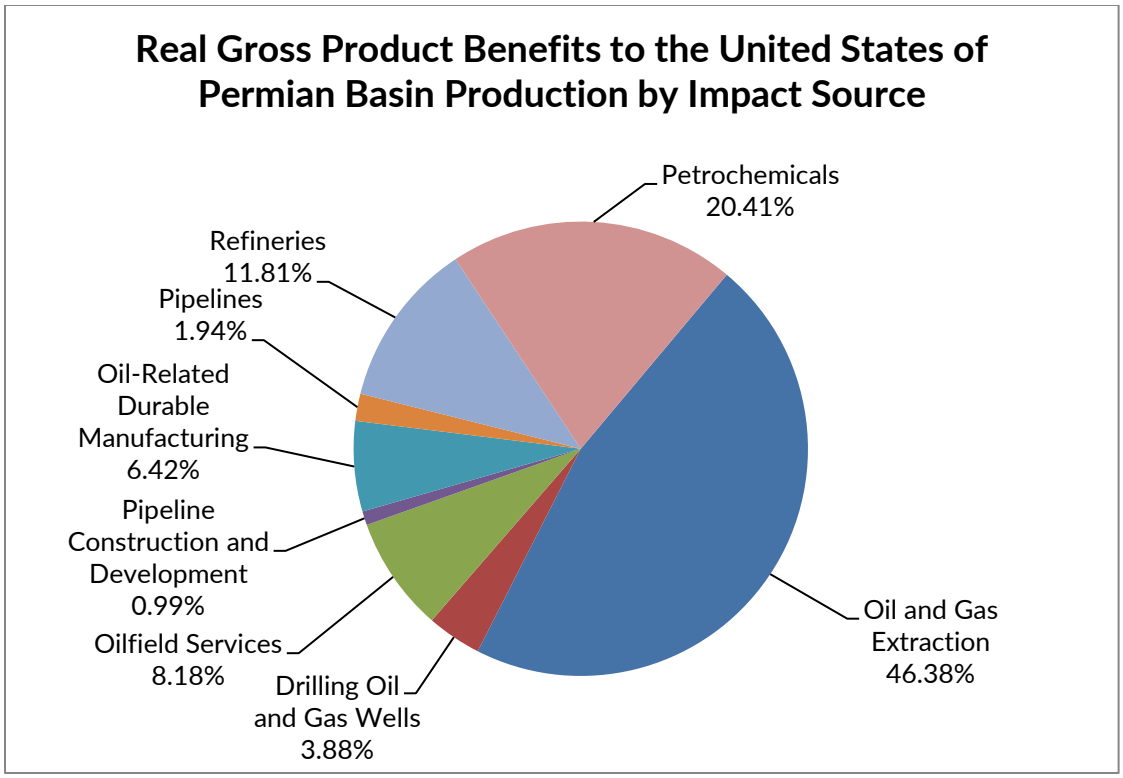
Total US economic benefits of production activity in the Permian Basin are estimated to include almost $187.2 billion in gross product each year and more than 1.5 million jobs.

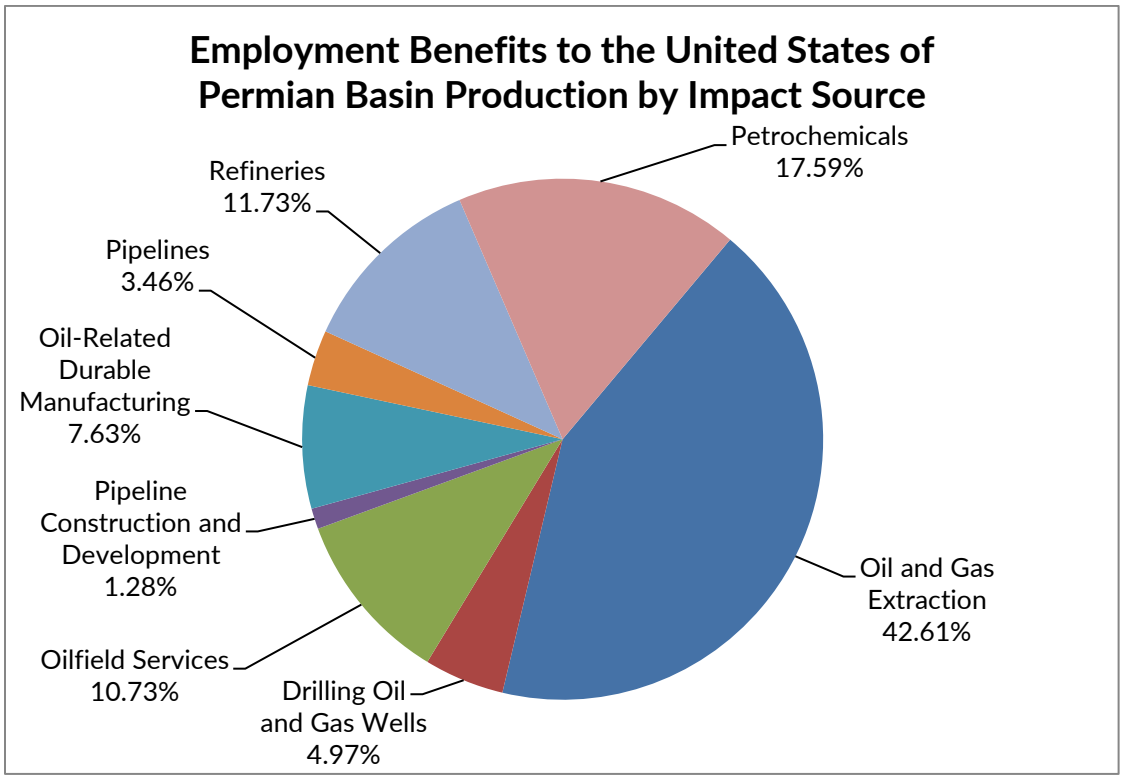
The Annual Impact of Permian Basin Oil Production on the US Economy

	Expenditures (Billions of 2020 Dollars)	**Gross Product** (Billions of 2020 Dollars)	**Personal Income** (Billions of 2020 Dollars)	**Employment** (Jobs)
Oil and Gas Extraction	$257.677 b	$86.810 b	$35.479 b	655,066
Drilling Oil and Gas Wells	$16.690 b	$7.263 b	$4.849 b	76,417
Oilfield Services	$32.735 b	$15.313 b	$10.389 b	164,937
Pipeline Construction and Development	$4.057 b	$1.846 b	$1.249 b	19,725
Oil-Related Durable Manufacturing	$28.967 b	$12.010 b	$7.699 b	117,369
Pipelines	$11.066 b	$3.624 b	$2.264 b	53,201
Refineries	$109.491 b	$22.094 b	$12.293 b	180,337
Petrochemicals	$101.607 b	$38.194 b	$20.726 b	270,406
TOTAL	**$562.292 b**	**$187.154 b**	**$94.947 b**	**1,537,458**

Note: Based on The Perryman Group's estimates of activity by segment in the energy sector and associated multiplier effects in 2019 to provide a snapshot of the importance of the industry based on known information.
Source: The Perryman Group

Oil and gas extraction and petrochemicals generate the largest components of the economic benefits.


Real Gross Product Benefits to the United States of Permian Basin Production by Impact Source
Petrochemicals 20.41%
Refineries 11.81%
Pipelines 1.94%
Oil-Related Durable Manufacturing 6.42%
Pipeline Construction and Development 0.99%
Oilfield Services 8.18%
Drilling Oil and Gas Wells 3.88%
Oil and Gas Extraction 46.38%


Employment Benefits to the United States of Permian Basin Production by Impact Source
Petrochemicals 17.59%
Refineries 11.73%
Pipelines 3.46%
Oil-Related Durable Manufacturing 7.63%
Pipeline Construction and Development 1.28%
Oilfield Services 10.73%
Drilling Oil and Gas Wells 4.97%
Oil and Gas Extraction 42.61%

Depending on the level of oil prices going forward, the total US gross product benefits through 2030 range from $118.8 billion under Very Low price assumptions to $347.1 billion per year if the High Price conditions prevail. Employment estimates for the US range from 863,556 job-years to 2,522,183 job-years in a typical year across the various potential market patterns.

Total Impact of Permian Basin Oil Production on the US Economy in a "Typical" Year Under Various Oil Price Assumptions

	Gross Product (Billions of 2020 Dollars)	**Employment** (job years)
Baseline Assumptions: 40% Probability ($55-$65 per barrel range on average)	$256.4 b	1,863,424
Low Price Assumptions: 25% Probability ($45-$55 per barrel range on average)	$217.9 b	1,583,346
High Price Assumptions: 30% Probability (above $70 on average)	$347.1 b	2,522,183
Very Low Price Assumptions: 5% Probability ($25-$35 per barrel range on average)	$118.8 b	863,556

Note: Based on The Perryman Group's estimates of stabilized production levels through 2030 under various oil price scenarios and the resulting economic impacts. Dollar amounts in constant 2020 dollars to eliminate the effects of inflation. A job-year is equivalent to one person working for one year, though it could be multiple individuals working partial years.
Source: The Perryman Group

In essence, these patterns reveal that the positive effects of Permian Basin activity on the national and state economies should expand beyond 2019 levels under any likely oil price patterns.

Permian Basin Energy Security and Balance of Payments Benefits

In addition to the sheer magnitude of the economic benefits described above, oil and gas production in the Permian Basin is also important to achieving major US policy goals, such as energy security and reducing the deficit in the balance of trade.

Energy Security

A further benefit from supporting the Permian Basin through this time is the added strength that Permian Basin production provides for the energy security for the entire United States. Energy security is commonly defined as the ability of US households and businesses to accommodate disruptions in energy markets.[1] The concept of energy security is typically synonymous with the decrease of the United States' dependence on foreign oil, particularly that produced in regions that are politically unstable or have significant interests adverse to the US, though recent focus has also expanded to include gas, electricity, and transportation issues (all of which are heavily impacted by petroleum).[2] According to the Department of Energy, major avenues for ensuring energy security include developing and protecting domestic access to energy, securing the electric grid, encouraging the development of global markets, and supporting the alliances and partnerships that strengthen energy security.[3] Of these approaches, the strategy that is impacted the most by the current energy sector environment is the continued access to energy through domestic oil production.

The issue of lowering dependence on foreign oil is centered on the fact that many of the largest oil companies in the world are state-owned and therefore affected by the policies and agendas of the states that control them. For the US, energy security does not have to mean energy independence in the sense that the US would be completely self-reliant, but rather to be able to consistently produce at high levels

[1] Energy Security in the United States, Congressional Budget Office, May 2012, p. 1.
[2] Valuation of Energy Security for the United States, Report to Congress, United States Department of Energy, January 2017, p. 2; Energy Security in the United States, Congressional Budget Office, May 2012, p. 1.
[3] Valuation of Energy Security for the United States, Report to Congress, United States Department of Energy, January 2017, p. 3-7.

and import from allies and countries that are unlikely to change the terms of their sale of oil and gas based on foreign policy.[4] Prior to the revolution brought about by new extraction technologies, major new discoveries, and improving cost parameters, it was thought that increasing imports from friendly sources was the primary vehicle to assure energy security (along with conservation). Given recent trends in US production and reserves, however, the US has emerged as the largest global producer. Another important aspect of decreasing dependence on foreign oil is to lower overall consumption of oil through conservation and new technologies as well as increasing domestic production of oil to meet US needs.

In 2018, US field production averaged almost 11.0 MMb/d and have more recently risen to 13.0 MMb/d.[5] Total 2018 US petroleum production (which includes not only field production, but also renewable fuels and oxygenate plant net production, and refinery processing gain) equaled 17.7 million barrels per day (MMb/d), 86% of the 20.5 MMb/d of domestic consumption, accounting for net imports.[6] Domestic production increased to 94% of domestic consumption in 2019 while consumption stayed relatively the same.[7] That same year, the nation imported a total of 9.1 MMb/d in petroleum products, 6.8 MMb/d of which was crude oil, while exporting 8.6 MMb/d.[8] The share of imports of crude oil and petroleum products from OPEC-member countries has generally decreased since the 1970s and more notably over the past decade.[9] In 2019, OPEC members only accounted for 18% of US petroleum imports while Canada by far was the nation's largest trading partner at 49%.[10] While

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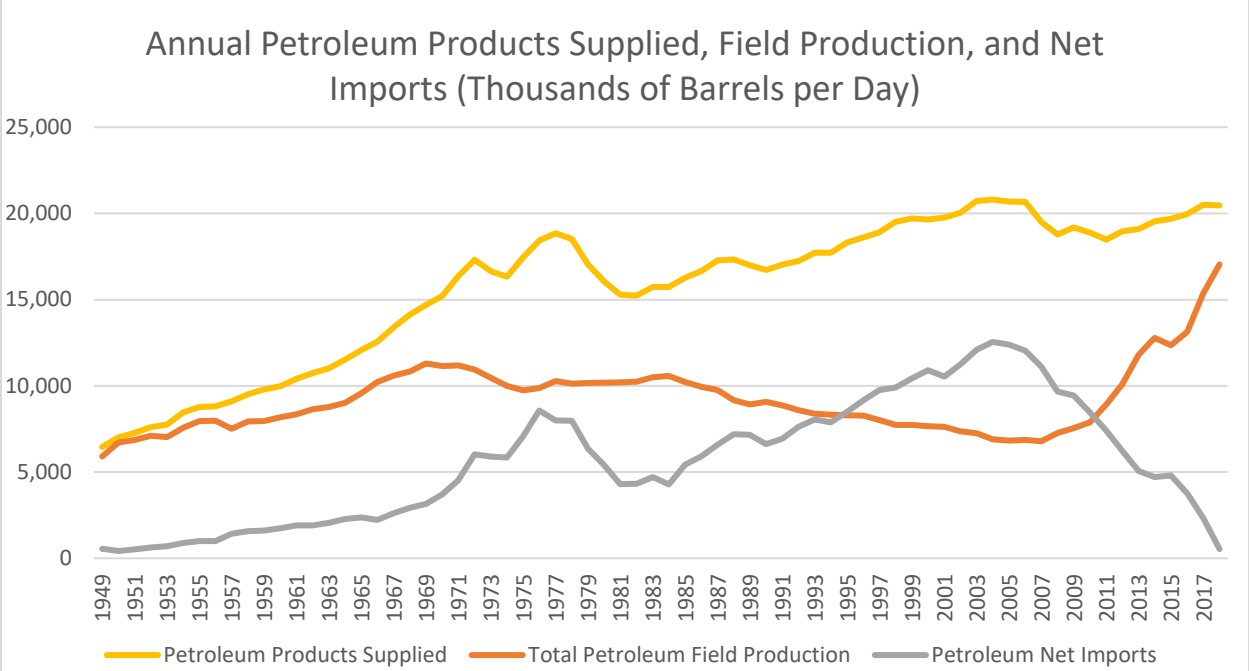
[4] Energy Security in the United States, Congressional Budget Office, May 2012, p. 1; Valuation of Energy Security for the United States, Report to Congress, United States Department of Energy, January 2017, p. 6.
[5] March 2020 Monthly Energy Review, March 26, 2020, U.S. Energy Information Administration, p. 59.
[6] Oil Imports and Exports, U.S. Energy Information Administration, May 29, 2019, https://www.eia.gov/energyexplained/oil-and-petroleum-products/imports-and-exports.php.
[7] March 2020 Monthly Energy Review, March 26, 2020, U.S. Energy Information Administration, p. 59.
[8] Non-crude imports include hydrocarbon gas liquids, refined petroleum products such as gasoline or diesel fuel, and biofuels, *see* Frequently Asked Questions: How Much Petroleum Does the United States Import and Export?. U.S. Energy Information Administration, (n.d.), https://www.eia.gov/tools/faqs/faq.php?id=727&t=6; March 2020 Monthly Energy Review, March 26, 2020, U.S. Energy Information Administration, p. 59.
[9] Oil Imports and Exports, U.S. Energy Information Administration, May 29, 2019, https://www.eia.gov/energyexplained/oil-and-petroleum-products/imports-and-exports.php.
[10] U.S. Imports by Country of Origin (Annual- Thousand Barrels per Day), Total Crude Oil and Products, U.S. Energy Information Administration, April 3, 2020, https://www.eia.gov/dnav/pet/pet_move_impcus_a2_nus_ep00_im0_mbblpd_a.htm.

the nation's second largest trading partner has been Saudi Arabia over the past several years, the US imported more from Mexico in 2019 (7%).[11]

Overall, the United States' reliance on petroleum imports has decreased over the past two decades. Net imports (imports minus exports) decreased from a peak of 12.5 MMb/d in 2005 to only 2.3 MMb/d in 2018.[12] Net imports further decreased to an all-time low of 594,000 b/d in 2019.[13] This amount is low because large increases in exports (and domestic production to satisfy more of domestic demand) have offset only modest increases in consumption and imports. Exports of petroleum and other liquids more than doubled from 2014 to 2019, increasing from 4.2 MMb/d to 8.5 MMb/d over the five-year time period.[14] In fact, the vast majority of oil produced in the Permian Basin is exported in either crude or processed form. US production has increased dramatically as the newer technologies of hydraulic fracturing and horizontal drilling have unlocked new deposits of oil and natural gas for the nation. Daily US field production of crude oil more than doubled from 5.4 MMb/d in 2009 to 12.2 MMb/d in 2019.[15] The Permian Basin alone produced well over 4.0 MMb/d in 2019. The following graphic illustrates the historical patterns in production and imports and the remarkable shift that has occurred over the past decade.

[11] U.S. Imports by Country of Origin (Annual- Thousand Barrels per Day), Total Crude Oil and Products, U.S. Energy Information Administration, April 3, 2020, https://www.eia.gov/dnav/pet/pet_move_impcus_a2_nus_ep00_im0_mbblpd_a.htm.
[12] Oil Imports and Exports, U.S. Energy Information Administration, May 29, 2019, https://www.eia.gov/energyexplained/oil-and-petroleum-products/imports-and-exports.php; U.S. Net Imports of Crude Oil and Petroleum Products (Thousand Barrels per Day), U.S. Energy Information Administration, April 3, 2020, https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&s=mttntus2&f=a.
[13] U.S. Net Imports of Crude Oil and Petroleum Products (Thousand Barrels per Day), U.S. Energy Information Administration, April 3, 2020, https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&s=mttntus2&f=a.
[14] Exports, Petroleum and Other Liquids, U.S. Energy Information Administration, April 3, 2020, https://www.eia.gov/dnav/pet/pet_move_exp_a_EP00_EEX_mbblpd_a.htm.
[15] U.S. Field Production of Crude Oil, U.S. Energy Information Administration, April 3, 2020, https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&s=mcrfpus2&f=a.



Source: March 2020 Monthly Energy Review, March 26, 2020, U.S. Energy Information Administration.

Much of the large increase in domestic production has come from the activity in the Permian Basin. In late 2018, the US became the largest oil producer in the world, overtaking Saudi Arabia and Russia.[16] If Texas were a country, it would be the third largest oil producer by itself.[17] Early in 2019, the Permian Basin alone became the highest producing oil field in the world, overtaking Saudi Arabia's Ghawar oilfield.[18] As production has increased throughout the Permian Basin, important infrastructure has developed to support the drilling activity. Many small and medium sized drilling and oilfield services companies are an important part of the overall activity in the Permian Basin. Obviously, the current situation puts enormous stress on these firms and, as has occurred in prior market disruptions, consolidation is likely.

[16] Egan, Matt, America is Now the World's Largest Oil Producer, CNN, September 12, 2018, https://money.cnn.com/2018/09/12/investing/us-oil-production-russia-saudi-arabia/index.html.
[17] Egan, Matt, America is Now the World's Largest Oil Producer, CNN, September 12, 2018, https://money.cnn.com/2018/09/12/investing/us-oil-production-russia-saudi-arabia/index.html.
[18] Caldwell, Elizabeth, The Permian Basin in Now the Highest Producing Oilfield in the World, Energy in Depth, April 2, 2019, https://www.energyindepth.org/the-permian-basin-is-now-the-highest-producing-oilfield-in-the-world/; Krauss, Clifford, The 'Monster' Texas Oil Field That Made the U.S. a Star in the World Market, New York Times, February 3, 2019, https://www.nytimes.com/2019/02/03/business/energy-environment/texas-permian-field-oil.html?auth=linked-google1tap.

Balance of Trade Benefits

Protecting the Permian Basin energy sector infrastructure would help to improve the balance of trade by both increasing US exports and decreasing US imports of petroleum products. The Perryman Group estimates that the improvement in the international balance of payments of the United States as of 2019 was $39.5 billion. These estimates assume displacement of imports and increased exports of petroleum products. This amount is likely to increase over time with increasing US oil production, rising demand for petroleum products in developing nations, and increasing prices over time. The following table presents potential cumulative trade balance improvements through 2030 under various oil price assumptions.

Estimated US Balance of Trade Improvement Cumulatively Through 2030 Under Various Oil Price Scenarios

Baseline Assumptions: 40% Probability ($55-$65 per barrel range on average)	$595.3 billion
Low Price Assumptions: 25% Probability ($45-$55 per barrel range on average)	$505.8 billion
High Price Assumptions: 30% Probability (above $70 on average)	$805.7 billion
Very Low Price Assumptions: 5% Probability ($25-$35 per barrel range on average)	$275.9 billion

Note: Based on The Perryman Group's estimates of stabilized production levels through 2030 under various oil price scenarios and the resulting improvement in the US balance of trade. Dollar amounts in constant 2020 dollars to eliminate the effects of inflation.
Source: The Perryman Group

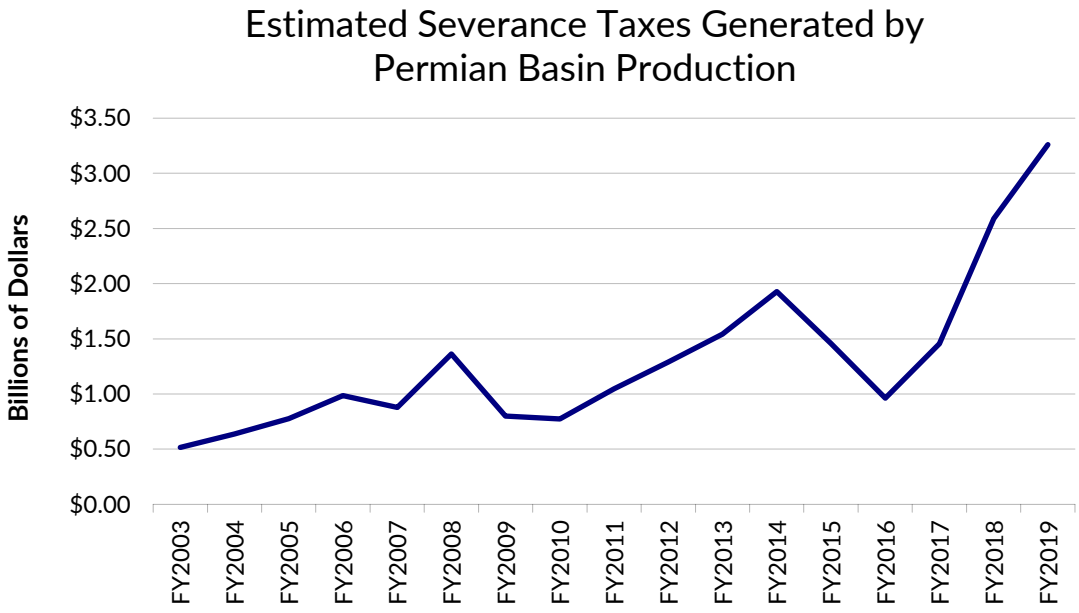
Fiscal Effects

The Permian Basin contributes billions in tax revenue to State and local taxing entities as well as the federal government. The two primary channels of tax benefits are severance taxes paid on production and the increased taxes associated with the total economic benefits measured in the course of this study.

Severance Taxes

Production in the Permian Basin generates billions in tax receipts to the State every year. Moreover, severance taxes have been rising significantly as production has increased.

In fiscal 2019, severance taxes on Permian Basin production reached an estimated $3.3 billion (based on an allocation of total severance taxes to the region using production data). Over the past 10 fiscal years, production in the Permian Basin has generated an estimated $16.3 billion in severance taxes to the State of Texas.



Note: Based on total severance tax data from the Texas Comptroller and an allocation to the Permian Basin using Texas Railroad Commission production data.
Source: The Perryman Group

The Perryman Group estimated potential severance tax collections through 2030 from Permian Basin production under various price assumptions. If prices generally remain in a $55-$65 range on average over the period (which is indicative of the pattern earlier this year prior to COVID-19), severance taxes paid through 2030 on Permian Basin production would total an estimated **$49.1 billion**. Taxes paid vary notably with average prices (which also affect production patterns), from a low of $22.8 billion through 2030 assuming very low prices typically in the $25-$35 range to $66.5 billion if prices are generally above $70 per barrel over the period.

Estimated Severance Tax Collections Through 2030 Under Various Oil Price Scenarios

	Permian Basin Production	Severance Tax Paid on Permian Basin Production
Baseline Assumptions: 40% Probability ($55-$65 per barrel range on average)	7.0-7.5 million barrels per day	$49.1 billion
Low Price Assumptions: 25% Probability ($45-$55 per barrel range on average)	6.5-7.0 million barrels per day	$41.8 billion
High Price Assumptions: 30% Probability (above $70 on average)	7.5-8.0 million barrels per day	$66.5 billion
Very Low Price Assumptions: 5% Probability ($25-$35 per barrel range on average)	3.3-3.8 million barrels per day	$22.8 billion

Note: Based on The Perryman Group's estimates of stabilized production levels through 2030 under various oil price scenarios and the resulting severance tax collections. Dollar amounts in constant 2020 dollars to eliminate the effects of inflation.
Source: The Perryman Group

Taxes from Economic Benefits

In addition, business activity generates tax revenue. The economic stimulus associated with the Permian Basin leads to a notable increase in tax receipts to the State and local government entities including cities, counties, schools, and special districts. Taxes are generated based on the increase in economic activity as described in the preceding sections.

For example, the increase in retail sales associated with the economic stimulus measured in this study was quantified (results appear in Appendix B), and a portion of these retail sales are taxable and lead to increased receipts to local taxing entities.

The Perryman Group estimates that total fiscal benefits through 2030 of additional business activity and severance taxes associated with Permian Basin production include $118.9 billion to the State, $88.2 billion to local government entities across Texas, and $456.0 billion to the federal government under baseline oil price assumptions.

Economic benefits also affect demand for housing and commercial real estate and, hence, property tax values. When the total economic effects are considered (such as those measured in this study), the gains in taxes from these sources are significant. The Perryman Group estimated the fiscal benefits to the State of Texas and local taxing entities across the state.

The Perryman Group estimates that total fiscal benefits through 2030 of additional business activity associated with Permian Basin production and severance taxes include **$118.9 billion** to the State, **$88.2 billion** to local government entities across Texas, and **$456.0 billion** to the federal government under baseline oil price assumptions. Results for other price scenarios are presented in the following table.

Total Fiscal Benefits Through 2030 Associated with Permian Basin Oil and Gas Production Under Various Oil Price Scenarios

	State of Texas (Billions of 2020 Dollars)	**Local Entities Across Texas** (Billions of 2020 Dollars)	**Federal** (Billions of 2020 Dollars)
Baseline Assumptions: 40% Probability ($55-$65 per barrel range on average)	$118.9	$88.2	$456.0
Low Price Assumptions: 25% Probability ($45-$55 per barrel range on average)	$101.0	$74.9	$387.5
High Price Assumptions: 30% Probability (above $70 on average)	$160.9	$119.4	$617.2
Very Low Price Assumptions: 5% Probability ($25-$35 per barrel range on average)	$55.1	$40.9	$211.3

Note: Increased tax receipts associated with the total economic benefits measured in this study and severance taxes as described above.
Source: The Perryman Group

Dealing with COVID-19 and Oil Market Issues

Drastic, but necessary, measures to "flatten the curve" and prevent a major spike in COVID-19 infections have involved shutting down much of the economy. The inevitable result has been the loss of millions of jobs and a sudden and unprecedented downturn throughout the country and, indeed, the entire world.

Massive layoffs and talk of double-digit unemployment have led to ubiquitous comparisons to the Great Depression. However, these assertions are simply wrong. Prior to the Great Depression, there were massive structural problems in the economy, and policy responses were less well understood. The current situation emanates from a horrific pandemic, but the economic structure was basically sound as we entered this situation.

Aggressive actions are being taken by the Federal Reserve, the federal government, and states and local areas across the country to help mitigate the economic damage. Assuming the underlying structure remains essentially in place, the downturn, while sharp and painful, will likely be more of a pause than a fundamental change. There will certainly be permanent changes in many aspects of the economy, some of them major, but the overall size and scope of activity should return to essentially its prior path in the coming years.

This phenomenon is particularly relevant to the situation in the Permian Basin. Many are naturally drawing comparisons to the horrific downturn in 1980s. While such discussions are inevitable, they are also misplaced. One major difference is the sheer speed with which it occurred. The prior decline began in early 1982 and did not reach its nadir until a rapid fall in 1986. The current situation unfolded in a matter of weeks. The 1980s debacle occurred in the midst of a savings and loan and real estate crisis that lead to massive failures throughout the financial system and took years to repair. It was further complicated by the complex geopolitics involved in ending the Cold War. The pandemic arose as the country was enjoying the longest expansion in history with no major structural dislocations. The 1980s came on the heels of the 1970s embargo and energy crisis which brought major cutbacks in energy usage and sluggish demand. The current situation arose as emerging countries were driving a solid global increase in demand. The 1980s were in the midst of a multi-decade period of declining reserves and production where the sustainable future of the region was in doubt. Today, reserves are expanding, technology is evolving rapidly, production is twice its prior peak, and there are centuries of supply. The near-term situation is dire and unlike anything seen before, but it is a temporary aberration

caused by an unprecedented health issue. It is not the 1980s, and the future prospects remain promising.

US Economic Outlook

The Perryman Group's most recent projections incorporate the potential effects of COVID-19. The US forecast calls for significant losses this year of an estimated 9.8 million jobs and $1.0 trillion in output (real gross domestic product) relative to 2019. However, a fairly rapid recovery is expected once the worst virus issues have passed, with the addition of a projected 7.3 million jobs in 2021 (a 5.2% gain) and $973.7 billion in output (5.4% growth). Projections indicate that US employment does not get back to 2019 levels until 2022, with about two to five years required to achieve pre-virus baseline expectation (assuming no additional shutdowns are required).

US Key Economic Indicators

	2020		2021	
Nominal Gross Product (billions of current $)	-$776.9 b	-3.69%	+$1,278.2 b	+6.30%
Real Gross Product (billions of 2012 $)	-$1,042.3 b	-5.47%	+$973.7 b	+5.40%
Personal Income (billions of current $)	-$762.8 b	-4.09%	+$1,241.0 b	+6.93%
Total Employment (millions)	-9.818 m	-6.49%	+7.338 m	+5.19%

Source: The Perryman Group

Not only has economic activity decreased from pre-crisis levels, but the economy will also experience a loss from the future growth that was projected to occur but for the pandemic. Therefore, once the US economy recovers to pre-COVID-19 levels, there will still be a loss from what growth could have been had the trajectory not been interrupted. The Perryman Group estimates that through 2020, the US economy will have lost nearly $1.5 trillion in real gross product and 12.3 million jobs compared to pre-virus projections for 2020.

Change in 2020 US Economic Outlook Compared to Pre-Virus Projections	
Nominal Gross Product (billions of current $)	-$1,624.0 b
Real Gross Product (billions of 2012 $)	-$1,455.4 b
Personal Income (billions of current $)	-$1,682.9 b
Total Employment (millions)	-12.257 m
Source: The Perryman Group	

Texas Economic Outlook

While the entire nation will be deeply impacted by the pandemic, for Texas, the negative effects of COVID-19 have obviously been compounded by turmoil in energy markets as previously described. The Perryman Group's forecast for Texas indicates losses this year of a projected 861,000 jobs (a 6.48% decrease) and $133.8 billion in output (down 7.6%). On a relative basis, these losses exceed those for the nation as a whole. For 2021, the state is forecast to add almost 685,000 jobs for a 5.51% gain, with an increase in output of $154.4 billion (9.5% growth). Projections indicate that employment does not get back to 2019 levels until 2022, with about two to five years required to achieve pre-virus baseline expectations (assuming no additional shutdowns are required).

Texas Key Economic Indicators				
	2020		2021	
Nominal Gross Product (billions of current $)	-$78.6 b	-4.11%	+$204.3 b	+11.13%
Real Gross Product (billions of 2012 $)	-$133.8 b	-7.60%	+$154.4 b	+9.50%
Wage & Salary Employment	-860,967	-6.48%	+684,793	+5.51%
Source: The Perryman Group				

In terms of how the effects of coronavirus will impact different industries, the largest losses in output are projected to occur in the mining industry (primarily due to falling

oil prices and the resulting dramatic slowdown in oil and gas activity), followed by the manufacturing, retail trade, and accommodation and food services industries. Over 50% of decreases in real gross product (output) are expected to occur in the mining industry, a loss of $72.7 billion through 2020. Recovery is expected to occur in 2021 in all industries, with mining increasing by $54.3 billion during 2021 and regaining much, but not all, of the prior activity levels. Proportionally, the increases in output during the recovery in 2021 are projected to be spread across multiple industries, with 35.2% of the growth concentrated in the mining industry, while manufacturing, wholesale trade, and retail trade are estimated to see notable increases and recovery to pre-virus levels.

Projected Change in Texas Real Gross Product (Output) by Industry

Industry	2020		2021	
Agriculture	-$799.5 m	-6.51%	+$583.2 m	+5.08%
Mining	-$72,719.0 m	-31.03%	+$54,281.1 m	+33.58%
Utilities	-$1,904.8 m	-7.34%	+$1,731.2 m	+7.20%
Construction	-$2,987.1 m	-3.92%	+$3,754.3 m	+5.12%
Manufacturing	-$22,672.5 m	-9.82%	+$23,977.3 m	+11.51%
Wholesale Trade	-$6,594.6 m	-4.54%	+$10,041.2 m	+7.25%
Retail Trade	-$9,404.7 m	-9.55%	+$9,572.2 m	+10.75%
Transportation and Warehousing	-$3,918.5 m	-6.87%	+$4,525.5 m	+8.51%
Information	-$5,245.6 m	-7.13%	+$7,134.9 m	+10.44%
Finance and Insurance	-$827.5 m	-1.05%	+$3,855.9 m	+4.95%
Real Estate and Rental/Leasing	-$1,089.1 m	-0.68%	+$7,025.7 m	+4.45%
Professional, Scientific, Technical Services	+$50.4 m	+0.04%	+$6,687.6 m	+5.45%
Management of Companies	-$461.7 m	-1.76%	+$1,705.9 m	+6.63%
Administrative, Support, Waste Management	+$171.4 m	+0.31%	+$2,947.7 m	+5.37%
Educational Services	-$417.3 m	-3.66%	+$726.1 m	+6.62%
Health Care and Social Assistance	+$4,770.8 m	+4.57%	+$2,858.9 m	+2.62%
Arts, Entertainment, and Recreation	-$2,596.3 m	-23.51%	+$1,772.0 m	+20.98%
Accommodation and Food Services	-$8,610.0 m	-19.84%	+$6,638.9 m	+19.09%
Other Services	-$2,115.8 m	-6.80%	+$2,298.0 m	+7.93%
Government and Government Enterprises	+$3,554.7 m	+2.18%	+$2,328.2 m	+1.40%
Total	**-$133,816.6 m**	**-7.60%**	**+$154,445.8 m**	**+9.50%**

Source: The US Multi-Regional Econometric Model, The Perryman Group

In terms of wage and salary employment, the largest losses will occur in the accommodation and food services industry due to general demand decreases associated with social distancing measures; across the state, the industry is expected to lose over 268,000 jobs in 2020, though it will recover nearly 168,000 in 2021. Other large employment declines are projected to occur in retail trade and manufacturing. The health care and social assistance as well as government and government enterprises industries are the only industries projected to increase employment during 2020, which is understandable due to the nature of the coronavirus crisis. Growth will occur in all industries in 2021, though most will require more time to recover to pre-virus employment levels.

Projected Change in Texas Wage & Salary Employment by Industry

Industry	2020		2021	
Agriculture	-6,076	-7.19%	+3,394	+4.33%
Mining	-88,660	-34.11%	+50,558	+29.52%
Utilities	-4,485	-8.59%	+2,744	+5.75%
Construction	-39,923	-5.02%	+29,609	+3.92%
Manufacturing	-114,996	-12.64%	+64,821	+8.16%
Wholesale Trade	-38,418	-6.29%	+30,399	+5.31%
Retail Trade	-156,548	-11.59%	+99,901	+8.37%
Transportation and Warehousing	-44,621	-8.44%	+32,657	+6.74%
Information	-20,193	-9.91%	+12,504	+6.81%
Finance and Insurance	-17,878	-3.04%	+16,600	+2.91%
Real Estate and Rental/Leasing	-5,587	-2.38%	+6,227	+2.72%
Professional, Scientific, Technical Services	-12,433	-1.53%	+30,559	+3.82%
Management of Companies	-5,322	-3.63%	+6,529	+4.63%
Administrative, Support, Waste Management	-13,658	-1.63%	+27,706	+3.36%
Educational Services	-9,275	-4.70%	+10,330	+5.50%
Health Care and Social Assistance	+50,744	+3.31%	+22,127	+1.40%
Arts, Entertainment, and Recreation	-36,539	-24.13%	+23,034	+20.05%
Accommodation and Food Services	-268,392	-21.32%	+167,737	+16.93%
Other Services	-48,958	-7.53%	+42,918	+7.14%
Government and Government Enterprises	+20,251	+0.97%	+4,437	+0.21%
Total	**-860,967**	**-6.48%**	**+684,793**	**+5.51%**

Source: The US Multi-Regional Econometric Model, The Perryman Group

In addition to the change from pre-virus economic conditions, Texas will also experience losses from the growth that would have been expected but for the impact from the coronavirus (pre-virus baseline). For example, through 2020, Texas will experience an overall loss of 1.1 million jobs from the level of employed that was forecast prior to the coronavirus crisis. The largest gaps from projected employment levels are expected to be in the accommodation and food services, retail trade, and manufacturing industries. It is important to note that the majority of the positive change in employment expected in the health care and social assistance as well as the government and government enterprises industries through 2020 is from growth that was already projected to occur. The increases are relatively smaller when compared against what growth was already projected, indicating that while the coronavirus did stimulate some additional growth of employment in those industries, the overall gain in employment was largely due to natural growth in those industries that was not hindered due to the circumstances of the pandemic.

Projected 2020 Texas Wage & Salary Employment by Industry Compared to Pre-Virus Projections	
Agriculture	-6,441
Mining	-95,959
Utilities	-5,003
Construction	-49,551
Manufacturing	-120,938
Wholesale Trade	-49,604
Retail Trade	-178,945
Transportation and Warehousing	-54,926
Information	-22,614
Finance and Insurance	-24,602
Real Estate and Rental/Leasing	-8,757
Professional, Scientific, Technical Services	-36,701
Management of Companies	-9,191
Administrative, Support, Waste Management	-34,568
Educational Services	-14,956
Health Care and Social Assistance	+3,436
Arts, Entertainment, and Recreation	-41,282
Accommodation and Food Services	-301,917
Other Services	-64,769
Government and Government Enterprises	+5,565
Total	**-1,111,724**
Source: The US Multi-Regional Econometric Model, The Perryman Group	

Permian Basin Economic Outlook

Obviously, the rapid decline in energy demand has magnified the effects of COVID-19 in the Permian Basin. In the midst of the oil market turmoil, unfavorable comparisons to the 1980s oil bust are inevitably being drawn. However, as discussed in detail above, the current situation is completely different. The initial shock is much more severe, yet the path to recovery should be decidedly more rapid.

Notably, the current situation is caused by a health crisis that rapidly shuttered much of the world economy. There were no major structural problems prior to COVID-19, and once the economy can reopen, a substantial portion of global oil consumption should resume quickly. In fact, with the recent OPEC++ agreement and the related effects of bringing fewer wells online in the US and elsewhere, only about half of the lost demand must be restored to facilitate a more orderly market. As a result, the

beginnings of a robust recovery in the oil and gas sector should begin to occur well before the economy gets back to pre-COVID-19 levels.

Recovery of oil prices is particularly critical to the Permian Basin. As the global economy begins to recover from COVID-19 restrictions and travel prohibitions, oil markets can normalize expeditiously. Prices should recover to sustainable levels for West Texas producers (where costs were falling notably for years before the pandemic) in the next several months. The typical "break-even" price in the region has fallen by about 36% in the past five years and that trend will likely continue and even accelerate going forward.

The Perryman Group's forecast indicates that the Permian Basin region (as measured by the Permian Basin Council of Governments region) will experience losses of $14.1 billion in output and 35,900 jobs in 2020. Note that these losses are expressed on an annual average basis; the losses in the coming months will be higher, with some recovery occurring later in the year. Not surprisingly, the percentage losses are much higher in this area than in the state or nation as a whole. Although it will likely take additional years to fully recover to pre-virus levels, the region is expected to experience significant growth in 2021. Nominal gross product will recover to pre-virus levels while real gross product will see a sizeable increase of $10.8 billion in 2012 dollars (24.57% gain). The region will add nearly 23,200 jobs in 2021 (10.43% growth), recovering 64.5% of the jobs lost in the previous year.

Permian Basin Key Economic Indicators

	2020		2021	
Nominal Gross Product (billions of current $)	-$10.0 b	-19.07%	+$10.5 b	+24.79%
Real Gross Product (billions of 2012 $)	-$14.1 b	-24.22%	+$10.8 b	+24.57%
Wage & Salary Employment	-35,902	-13.92%	+23,157	+10.43%

Source: The Perryman Group

In terms of impact by industry, the losses in output will overwhelmingly occur in the mining industry, which is projected to decrease by $13.1 billion in real gross product in 2020, 93.4% of the drop in total output in the region. Other significant losses are expected to occur in the manufacturing, wholesale trade, and retail trade industries. Through 2021, the mining industry will grow by 40.0% for an $9.4 billion increase

while many other industries will experience gains to more than offset any declines of the previous year.

Projected Change in the Permian Basin Real Gross Product (Output) by Industry				
Industry	**2020**		**2021**	
Agriculture	-$17.5 m	-6.47%	+$12.5 m	+4.93%
Mining	-$13,118.8 m	-35.93%	+$9,359.0 m	+40.01%
Utilities	-$39.1 m	-7.39%	+$35.5 m	+7.24%
Construction	-$62.6 m	-3.88%	+$81.6 m	+5.26%
Manufacturing	-$193.1 m	-8.49%	+$230.0 m	+11.05%
Wholesale Trade	-$173.0 m	-4.53%	+$270.8 m	+7.43%
Retail Trade	-$167.7 m	-9.54%	+$173.1 m	+10.89%
Transportation and Warehousing	-$61.4 m	-6.88%	+$72.4 m	+8.71%
Information	-$45.9 m	-6.99%	+$65.0 m	+10.65%
Finance and Insurance	-$4.9 m	-0.72%	+$33.2 m	+4.89%
Real Estate and Rental/Leasing	-$16.3 m	-0.70%	+$104.5 m	+4.53%
Professional, Scientific, Technical Services	+$0.7 m	+0.07%	+$55.4 m	+5.61%
Management of Companies	+$2.7 m	+0.63%	+$23.6 m	+5.37%
Administrative, Support, Waste Management	-$2.2 m	-0.40%	+$32.9 m	+5.99%
Educational Services	-$7.4 m	-13.78%	+$6.1 m	+13.14%
Health Care and Social Assistance	+$43.4 m	+4.52%	+$26.0 m	+2.59%
Arts, Entertainment, and Recreation	-$44.4 m	-35.08%	+$27.5 m	+33.51%
Accommodation and Food Services	-$148.0 m	-19.56%	+$115.5 m	+18.98%
Other Services	-$42.3 m	-6.90%	+$45.6 m	+7.99%
Government and Government Enterprises	+$44.6 m	+2.03%	+$30.4 m	+1.35%
Total	**-$14,053.3 m**	**-24.22%**	**+$10,800.5 m**	**+24.57%**
Source: The US Multi-Regional Econometric Model, The Perryman Group				

While much of the decline in output will be overwhelmingly concentrated in the mining industry (losses in other industries will be significantly overshadowed by even larger losses in oil and gas), decreases in employment in 2020 will be slightly more spread across various industries, though 60.4% of the total decrease in jobs will still come from mining with close to 21,700 jobs lost on an annualized basis compared to 2019. The accommodation and food services industry as well as the retail trade

industry are also projected to undergo heavy declines which will only partly be recouped in 2021. Though many industries will recover in terms of output, as shown above, employment will lag behind as the regional economy begins to recover in 2021. The mining industry is expected to grow by 12,200 jobs in 2021 (a 35.7% rate of growth). The accommodation and food services industry is projected to add over 3,000 jobs that year as well (a 16.8% growth rate).

Projected Change in the Permian Basin Wage & Salary Employment by Industry

Industry	2020		2021	
Agriculture	-224	-7.03%	+128	+4.32%
Mining	-21,675	-38.80%	+12,219	+35.74%
Utilities	-122	-8.64%	+74	+5.79%
Construction	-919	-4.99%	+711	+4.06%
Manufacturing	-1,306	-11.34%	+786	+7.71%
Wholesale Trade	-1,025	-6.28%	+839	+5.49%
Retail Trade	-2,856	-11.58%	+1,854	+8.50%
Transportation and Warehousing	-1,004	-8.45%	+754	+6.93%
Information	-265	-9.71%	+174	+7.08%
Finance and Insurance	-147	-2.72%	+149	+2.84%
Real Estate and Rental/Leasing	-126	-2.40%	+144	+2.80%
Professional, Scientific, Technical Services	-124	-1.50%	+324	+3.97%
Management of Companies	-31	-1.29%	+79	+3.39%
Administrative, Support, Waste Management	-167	-2.32%	+280	+3.97%
Educational Services	-165	-14.71%	+114	+11.96%
Health Care and Social Assistance	+459	+3.26%	+198	+1.37%
Arts, Entertainment, and Recreation	-714	-35.60%	+419	+32.48%
Accommodation and Food Services	-4,805	-21.04%	+3,034	+16.83%
Other Services	-941	-7.62%	+821	+7.20%
Government and Government Enterprises	+254	+0.82%	+52	+0.17%
Total	-35,902	-13.92%	+23,157	+10.43%

Source: The US Multi-Regional Econometric Model, The Perryman Group

Compared to previously forecasted levels for the region prior to the pandemic, overall employment is expected to drop by 41,300 jobs in 2020. Again, while many of

the job losses will come from the mining (oil and gas) industry, there will also be sizeable declines in the accommodation and food services and retail trade industries as general demand falls due to social distancing measures and income disruptions. Again, similar to Texas as a whole, employment gains projected in the health care and social assistance and the government and government enterprises industries are lower when compared to previous growth projections, indicating that a lot of this growth is due to these industries being less likely to be interrupted because of coronavirus and therefore allowing more of the expected growth to occur, rather than being directly stimulated because of the pandemic.

Projected 2020 Permian Basin Wage & Salary Employment by Industry Compared to Pre-Virus Projections	
Agriculture	-241
Mining	-23,286
Utilities	-136
Construction	-1,170
Manufacturing	-1,421
Wholesale Trade	-1,351
Retail Trade	-3,296
Transportation and Warehousing	-1,255
Information	-307
Finance and Insurance	-215
Real Estate and Rental/Leasing	-199
Professional, Scientific, Technical Services	-385
Management of Companies	-95
Administrative, Support, Waste Management	-363
Educational Services	-197
Health Care and Social Assistance	+33
Arts, Entertainment, and Recreation	-776
Accommodation and Food Services	-5,435
Other Services	-1,242
Government and Government Enterprises	+73
Total	**-41,264**
Source: The US Multi-Regional Econometric Model, The Perryman Group	

Odessa Economic Outlook

Odessa is a key business hub for oil and gas activity in the Permian Basin and is a major population center for the region. Therefore, Odessa is projected to be impacted in many similar ways as the rest of the Permian Basin and to experience a substantial portion of the region's employment changes. In fact, about 29.0% of the loss in employment projected for the Permian Basin in 2020 is expected to occur in the Odessa MSA.

The forecast for the Odessa metropolitan area calls for significant losses this year of an estimated 10,400 jobs and $1.5 billion in output (real gross domestic product) on an annualized basis relative to 2019, with substantially higher losses over the next few months. However, some recovery is expected once the worst virus issues have passed and oil markets begin to recover, with the addition of a projected 6,890 jobs in 2021 (a 9.46% gain) and $1.3 billion in output (15.09% growth).

Odessa MSA Key Economic Indicators

	2020		2021	
Nominal Gross Product (billions of current $)	-$1.3 b	-11.38%	+$1.8 b	+17.24%
Real Gross Product (billions of 2012 $)	-$1.5 b	-14.59%	+$1.3 b	+15.09%
Wage & Salary Employment	-10,394	-12.48%	+6,889	+9.46%

Source: The Perryman Group

Similar to the entire Permian Basin, the projected losses in output in 2020 are expected to be largely dominated by the decline in the mining industry, with 79.7% of losses stemming from that industry due to the disruptions in the oil and gas sector (and the fact that oil and gas related services and production are industries characterized by high output per worker). Specifically, the mining industry is expected to decrease by $1.2 billion in 2020, though that decline will be substantially offset by anticipated output growth of $875 million in 2021. Other notable losses in output in 2020 are projected to occur in the wholesale trade, retail trade, and manufacturing industries. However, those industries should generally recover to pre-virus levels during 2021.

Projected Change in the Odessa MSA Real Gross Product (Output) by Industry				
Industry	**2020**		**2021**	
Agriculture	+$0.5 m	-6.21%	-$0.4 m	+5.15%
Mining	-$1,217.3 m	-35.04%	+$875.1 m	+38.78%
Utilities	-$7.8 m	-7.35%	+$7.1 m	+7.26%
Construction	-$26.4 m	-3.94%	+$33.7 m	+5.23%
Manufacturing	-$56.4 m	-7.86%	+$69.8 m	+10.55%
Wholesale Trade	-$64.2 m	-4.56%	+$99.5 m	+7.41%
Retail Trade	-$60.2 m	-9.59%	+$61.6 m	+10.86%
Transportation and Warehousing	-$21.8 m	-6.79%	+$26.2 m	+8.77%
Information	-$9.9 m	-6.18%	+$15.9 m	+10.53%
Finance and Insurance	-$1.2 m	-0.95%	+$6.3 m	+4.94%
Real Estate and Rental/Leasing	-$6.0 m	-0.67%	+$40.2 m	+4.54%
Professional, Scientific, Technical Services	-$0.9 m	-0.34%	+$15.1 m	+5.90%
Management of Companies	-$0.7 m	-1.74%	+$2.7 m	+6.72%
Administrative, Support, Waste Management	+$1.3 m	+0.69%	+$11.0 m	+5.84%
Educational Services	-$3.1 m	-27.01%	+$2.0 m	+24.37%
Health Care and Social Assistance	+$14.3 m	+4.50%	+$8.6 m	+2.57%
Arts, Entertainment, and Recreation	-$12.5 m	-42.09%	+$7.5 m	+43.74%
Accommodation and Food Services	-$53.2 m	-19.90%	+$41.2 m	+19.26%
Other Services	-$14.9 m	-6.26%	+$16.9 m	+7.57%
Government and Government Enterprises	+$13.1 m	+2.09%	+$9.0 m	+1.41%
Total	**-$1,527.3 m**	**-14.59%**	**+$1,348.9 m**	**+15.09%**
Source: The US Multi-Regional Econometric Model, The Perryman Group				

Overall, the Odessa MSA is expected to lose 10,400 jobs in 2020, a decrease of 12.48% (for reference, wage and salary employment was 83,300 in 2019). More than half of those losses are projected to be in the mining industry, over 5,200 jobs. Accommodation and food services employment is forecasted to decrease by 1,800 jobs and retail trade by another 1,000 jobs. Again, these values are annual averages, with near-term losses being much greater. Most industries will need more than the following year to recover the lost employment. The exceptions include the professional, scientific, and technical services and administrative, support, and waste management industries which are projected to grow significantly in 2021. Both of these industries also show substantially larger losses when compared to pre-virus employment projections (see table below), indicating these were high growth

industries that will bounce back at a faster pace due to greater demand for these positions in the local economy.

Projected Change in the Odessa MSA Wage & Salary Employment by Industry				
Industry	**2020**		**2021**	
Agriculture	-4	-6.89%	+2	+4.40%
Mining	-5,238	-37.95%	+2,960	+34.56%
Utilities	-22	-8.60%	+13	+5.81%
Construction	-383	-5.05%	+290	+4.03%
Manufacturing	-534	-10.74%	+320	+7.22%
Wholesale Trade	-406	-6.31%	+329	+5.47%
Retail Trade	-1,014	-11.63%	+653	+8.48%
Transportation and Warehousing	-366	-8.36%	+281	+6.99%
Information	-86	-8.98%	+60	+6.90%
Finance and Insurance	-45	-2.94%	+43	+2.90%
Real Estate and Rental/Leasing	-48	-2.37%	+56	+2.82%
Professional, Scientific, Technical Services	-44	-1.90%	+96	+4.26%
Management of Companies	-15	-3.61%	+19	+4.71%
Administrative, Support, Waste Management	-33	-1.25%	+98	+3.82%
Educational Services	-64	-27.80%	+38	+23.06%
Health Care and Social Assistance	+161	+3.25%	+69	+1.35%
Arts, Entertainment, and Recreation	-194	-42.56%	+112	+42.63%
Accommodation and Food Services	-1,828	-21.37%	+1,150	+17.11%
Other Services	-309	-6.99%	+279	+6.79%
Government and Government Enterprises	+76	+0.88%	+19	+0.22%
Total	**-10,394**	**-12.48%**	**+6,889**	**+9.46%**
Source: The US Multi-Regional Econometric Model, The Perryman Group				

The additional loss of employment as compared to pre-virus projections show again that there are further interruptions to the local economy beyond the immediate job losses. Instead, the area is missing out on the expected future job growth that would have occurred, but for the pandemic. While job growth in the health care and social assistance and the government and government enterprises industries is projected to

be able to continue unhindered, mining and accommodation and food services will experience additional hundreds of job losses.

Projected 2020 Odessa MSA Wage & Salary Employment by Industry Compared to Pre-Virus Projections	
Agriculture	-4
Mining	-5,636
Utilities	-24
Construction	-481
Manufacturing	-580
Wholesale Trade	-532
Retail Trade	-1,165
Transportation and Warehousing	-463
Information	-104
Finance and Insurance	-64
Real Estate and Rental/Leasing	-77
Professional, Scientific, Technical Services	-118
Management of Companies	-27
Administrative, Support, Waste Management	-114
Educational Services	-70
Health Care and Social Assistance	+12
Arts, Entertainment, and Recreation	-209
Accommodation and Food Services	-2,064
Other Services	-415
Government and Government Enterprises	+18
Total	**-12,115**
Source: The US Multi-Regional Econometric Model, The Perryman Group	

While much of this report is appropriately focused on the energy sector in Odessa and the Permian Basin, it is important to note that ongoing efforts to develop the medical infrastructure in the area will continue to be a major priority. It is necessary to continue to emphasize attracting medical workers to the region, not just to meet short-term needs because of COVID-19, but for long-term needs as well. The area is already operating with a shortage of health care and social assistance workers compared to state averages, and the continued projected growth in these industries needs to be met with new workers in order to support the long-term growth in the area.

Responding to COVID-19 and Oil Market Issues

Supporting the structure of the energy sector in the Permian Basin through the current challenges can help ensure that it is in place and ready to resume production growth once the COVID-19 and oil market oversupply conditions are dealt with.

Because of the demand and supply shocks previously described, drilling activity has been severely curtailed in order to cut short-term spending. As the crisis continues, the Permian Basin along with the entire US energy industry will struggle as credit dries up and profits vanish. Small and medium sized businesses will be particularly impacted as they generally have reserves and ability to secure interim capital to aid in weathering the storm. Activity will ramp up once the disruption begins to subside; however, if the smaller drilling and oilfield services companies lack the financial capacity to quickly resume operations, the recovery in the local economy will face additional delays once social distancing is phased out. Some consolidation is inevitable in market downturns and will occur in the current environment. Nonetheless, smaller operations will remain a vital part of the local energy sector.

Strategic investments now in the Permian Basin energy industry will aid the economy of the area, the state, and the nation, as well as supporting other policy priorities such as energy security.

Because the economy of West Texas and Odessa is heavily impacted by the oil and gas industry, any delays will have widespread implications for the region. However, as noted, production in the Permian Basin supports about 10% of the Texas economy as well as billions in tax revenue to the federal, State, and local governments every year. Strategic investments in the sustainability of the Permian Basin energy industry will aid the economy of the area, the state, and the nation, as well as supporting other policy priorities such as energy security and enhancing the balance of trade.

In addition to federal assistance, many cities, counties, chambers of commerce, economic development corporations and other public and private entities are providing assistance to businesses and individuals to help with the economic challenges due to the shutting down of the economy. Similar actions are worthy of consideration for Odessa and the Permian Basin. The Perryman Group, assisted by TIP Strategies, visited with many of these organizations during the course of this investigation in order to determine the best practices that were occurring around the country.

The Perryman Group's assessment of the situation in Odessa indicates that the following actions should be taken, supported, and/or continued.

- utilize a task force of public-sector and private-sector community and business leaders,
- support grant and loan programs to affected businesses,
- provide assistance to local families,
- establish a clearinghouse for information related to available assistance and utilize available planning resources,
- engage in an information campaign to communicate to the community how the current downturn is different from others such as the 1980s,
- seek to provide universal broadband access throughout the community, and
- engage in a marketing and advocacy campaign to inform State and federal officials and private stakeholders across the country of the importance of the Permian Basin.

Utilize a Task Force of Public-Sector and Private-Sector Community and Business Leaders

Bringing together perspectives on issues from across the public and private sectors can have numerous benefits. In a time of social distancing, some types of entities are overwhelmed with additional demands, while others have resources to share. Dealing with COVID-19 and the oil industry problems will involve several phases, and regular exchange of ideas among individuals across the community can help identify the biggest issues and potential ways to deal with them.

This task force might include, among others, representation from the city, county, the school district, economic development corporation, higher education, nonprofits and churches, oil-industry firms, retail and hospitality firms, and others with perspectives which may add value. While there is a need for rapid action in the short term, the recovery process will be ongoing for months, if not years, to come, and an efficient means of sharing ideas could allow Odessa and the Permian Basin to emerge from this downturn faster and stronger.

A task force of community leaders from various industries and public-sector entities could enhance the exchange of valuable dialogue on problems and solutions. Consolidating ideas and information could help better tailor solutions to the local situation. The group that is currently spearheading Opportunity Odessa, the long-term planning initiative for the community funded by Grow Odessa, represents many

of these constituencies and might well provide an opportunity to jump start the response process.

Even though the most immediate response should appropriately be to deal with the dislocations caused by COVID-19 and the associated fallout in energy markets, it is also important to maintain an awareness of issues which will resurface as the economy recovers. Prior to this downturn, the region was facing workforce shortages, housing issues, educational and infrastructure needs, and other challenges associated with rapid economic expansion. While the picture is drastically different now, it is important not to lose sight of the fact that oil prices will rise again and these problems will resurface. Actions taken now would ideally not only deal with the current disruptions, but also set the stage for future growth in a healthy manner.

Support Grant and Loan Programs for Businesses

A common action taken to support local businesses is offering grants and low-interest loans. Across Texas, economic development corporations and cities are providing relief to small businesses. Some examples include the following.

- The Marble Falls Economic Development Corporation has implemented a COVID-19 Emergency Loan Program which will provide loans based on business receipts to assist with personnel costs, rent, utilities and related expenses.
- The Georgetown Chamber of Commerce and City of Georgetown have established a Covid-19 Small Business Resource Grant program to provide immediate financial relief to small businesses for business expenses such as rent and payroll.
- The Bastrop Economic Development Corporation has established a COVID-19 Relief Grant program to assist local businesses to expand to the size, enterprise and or revenue levels prior to the COVID-19 pandemic with grants to qualifying business.
- The Cedar Park Chamber of Commerce has established the Cedar Park COVID-19 Small Business Assistance Program with grants and loans (zero percent interest if repaid in 24 months) to provide funding for small businesses to cover economic damages from the COVID-19 pandemic including business lease or mortgage payments, utility payments, payroll for employees, and other approved business expenses.
- The Burnett Economic Development Corporation has established three Small Business Financial Assistance Loan Programs. COVID-19 Emergency Loan

Program 1 is intended to provide financial assistance to retail restaurants and businesses. COVID-19 Emergency Loan Program 2 is in addition to Program 1 and permits retail and restaurant businesses who met a local sales tax threshold in 2019 to apply for additional financial assistance. Retails and restaurants applying under Program 2 are also encouraged to apply under Program 1. COVID-19 Emergency Loan Program 3 is intended to provide financial assistance to retail, restaurant, and service businesses located within the city of Burnett who do not qualify for Programs 1 or 2. Loans have 0% interest with repayments starting in June 2021 and up to 50% could be forgiven based on timely payments and if the business is operating on May 30, 2022.

- The City of Fort Worth has teamed up with PeopleFund to launch the Business Resiliency Microloan Program to provide at least $850,000 (and potentially up to $1.7 million if needed) to eligible businesses in Fort Worth impacted by the COVID-19 crisis. Maximum loan amounts per business would be $50,000 with at least 60% of loan proceeds being allocated to minority-owned businesses and those with low to moderate income. Loans may be used to pay fixed debts, payroll or accounts payable or cover other bills that can't be paid due to the pandemic. Loans will have a 0% interest rate, no payments for the first six months, and a rate of 5% or less after that with amortization terms up to 78 months.
- The Austin Economic Injury Bridge Loan Program provides loans for daily needs like rent, payroll, and debt with a 12-month repayment term and 3.75% interest rate. This program is not designed to be a primary source of assistance to affected businesses and is only available to businesses that have applied for the US Small Business Administration (SBA) Economic Injury Disaster Loan.
- The Dallas City Council has approved $13.7 million in federally funded rental and mortgage assistance as well as $5 million from the Coronavirus Aid, Relief and Economic Security (CARES) Act for eligible small businesses. Other funding will go to eligible small businesses from funds Dallas has or will receive from the CARES Act.

For many businesses, the potential for survival is greatly enhanced by funds to help during this crisis. While many of the programs provide relatively small amounts ($5,000-$35,000 per business with most being $15,000 or less), they are designed as supplements to State and federal programs. In the current environment, even modest support can make a notable difference. Given the more urgent situation in Odessa, a more aggressive program should be considered.

Provide Assistance to Local Families

The human cost of the COVID-19 pandemic and oil downturn is multifaceted. From an economic perspective, job losses have been and will continue to be substantial in the near term. Unemployment and the related financial distress are causing issues ranging from difficulty paying utility bills to evictions. Many areas are taking steps to help those struggling due to the crisis, with actions ranging from utility bill relief to rent assistance and eviction delays.

For example, the Austin City Council approved a $15 million Relief in a State of Emergency (RISE) Fund to support COVID-19 emergency relief for Austin residents. Its focus is to provide immediate assistance to vulnerable, lower-income populations, who may either be ineligible for other forms of State or Federal assistance by partnering with existing social service agencies who have a demonstrated history of success in reaching vulnerable community members. The city council also approved $10 million in utility bill relief for Austin Water and Austin Energy customers that will be reflected in customer water and electric bills.

Beginning on May 1, Dallas residents will be able to apply for up to $1,500 per month for up to three months assistance for rent, mortgage, or utility payments. Those in need of longer-term help can apply for up to two years. Eligible residents must have incomes at or below 80% of the area median income. Some of the funds will also be used to assist residents who lost income or have increased expenses such as health care or childcare due to COVID-19. The City also adopted a temporary ordinance protecting renters from evictions if they have been impacted financially by COVID-19. The temporary ordinance gives renters 21 days to respond to a notice of eviction and an additional 60 days to catch up on rent before a landlord can begin eviction proceedings.

Food banks across the nation have been particularly hard pressed, with increasing needs and falling food donations from supermarkets, and the situation has also prevailed in West Texas. Supporting this essential source of nutrition for families in the region improves the quality of life for residents of the area. In addition, food banks reduce the economic costs of hunger and diminish the likelihood that people will leave the area (which would further exacerbate workforce issues as the area begins to recover). Other regional non-profit entities that meet immediate needs will also play a vital role in the recovery process and should be supported.

In the Odessa area, housing costs are causing particular problems. Because housing was in short supply before oil prices began to fall, rental rates in the area were expensive compared to other areas. With job losses and income reductions in Odessa

and the surrounding region, many households are no longer able to afford these escalated rates. The market will eventually make this adjustment naturally as demand falls and rents decline, but many people with current leases are locked into rent levels well above those justified under prevalent conditions and beyond their ability to pay. Addressing this temporary issue could potentially be facilitated by dialogue regarding potential solutions and ways the community could help resolve the problem by a group comprised of owners of housing, apartment owners/managers, renters, and others who are knowledgeable about the situation. Convening such a group to promulgate solutions is an example of the type of initiative that could be implemented by the task force described above. The likely alternative for a significant number of renters in the absence of some sort of assistance could be to simply leave the area or face evictions, which could leave landlords with unoccupied units while exacerbating future workforce shortages as the economy and energy sector recover. As noted above, the City of Dallas has recently established relief measures for renters.

Actions such as these can not only ease the burden on local families but can also help sustain the area workforce during the worst stages of the downturn.

Establish a Clearinghouse for Information Related to Available Assistance and Needs

Although there is support available from a variety of sources, it can be difficult to navigate the process. A clearinghouse for information and assistance with understanding what is available and how to tap resources could be extremely helpful, particularly to small businesses.

Local entities in some areas are providing assistance to businesses and individuals by setting up dedicated hotlines related to recovery where businesses can speak to experts about specifics issues. Cities and other local entities are also providing content on their websites or setting up specific websites focused on helping businesses and individuals with anything related to COVID-19. Such efforts in the Odessa area should be supported and expanded as needed.

Another valuable action is to capture any available information related to the major needs of businesses and individuals. There may be issues causing distress which are not readily apparent. A mechanism to collect and synthesize this information could help in determining future actions.

Engage in an Information Campaign for the Local Workforce

A crucial aspect of preserving the structure of the energy sector and, therefore, the Odessa and Permian Basin economies is to maintain the needed workforce. The current downturn is causing tremendous stress, and it is important to communicate to the community how it is different from others such as the 1980s. Workers making decisions about whether to stay in the area or industry may be more likely to stay if they understand that the industry downturn is not projected to drag on as long as some of the prior contractions such as occurred in the 1980s.

Although the precise pattern of the recovery is impossible to predict, the area economy was strong going into the COVID-19 pandemic and there are not major structural issues in the economy to hamper a return to growth once social distancing requirements can be relaxed and the global economy begins to restart. Moreover, production costs in the Permian Basin have been falling dramatically over the past few years, and the price levels needed to sustain the industry in the region have fallen as well.

Prominent psychologist Dan Kahneman received a Nobel Prize for work exploring how our behavior interacts with the economy. He demonstrated that how we present things can greatly affect our attitudes and actions. Focusing on worst case scenarios can, in and of itself, be harmful. In normal times, about 70% of the economy is driven by consumers, and the more negatively they see the current situation, the longer it may take to recover.

Informing people about expectations that the current situation is not another version of the 1980s can be helpful. In particular, those with skills which will be essential to restarting the oil industry may be less likely to disperse with no plan to return if they understand that recovery is expected eventually. Currently unemployed workers are having to make long-term decisions based on available options.

Communicating about the economic outlook as well as any other local employment opportunities that are available in the interim can aid in the decisions to wait out the suspension of drilling activity. The pre-virus local economy typically experienced labor shortages across various industries due to the competition with high paying, oil and gas industry jobs. While some other sectors may come back on line faster or prior to major oil and gas activity, oil and gas workers can fill some of these shortages while waiting on previous employment to restart. For example, there is a substantial skills overlap, and shortages in construction can temporarily be filled by oil and gas

labor and can provide local stimulus while the economy recovers. Facilitating access to the resources of the Permian Basin Workforce Development Board is one effective mechanism to assist in meeting transitional job needs.

Many federal and state agencies and entities are providing not only financial support, but also valuable information. For example, other sources of specific COVID-19 information for cities and other local entities include the Texas Economic Development Council, The Texas Municipal League, the International Economic Development Council (IEDC), and a website Restoreyoureconomy.org managed by IEDC and funded by the US Economic Development Administration. Assuring that local businesses can easily locate and access these resources can be helpful in managing through the current situation.

Though an exact timeline on a recovery is unknown and thus irresponsible to promise, information on the process can help retain workers so that resources are still present when activity comes back online. When coupled with programs to support local workers displaced by the situation, efforts of this nature can help to preserve the local workforce.

Seek to Provide Universal Broadband Access Throughout the Area

In conversations with local civic and education leaders as well as economic development professionals in areas of similar size around the state, it was consistently noted that one of the most important improvements that could be made is to significantly enhance broadband availability. Universal broadband internet access to the extent possible would greatly enhance the ability for remote work and education during periods of time when social distancing may be required. In addition, it would increase efficiency in the workplace once the current situation has passed.

The need is especially acute in smaller and mid-sized metropolitan areas and rural regions, and future economic development could be negatively affected. It is also likely that in the post-COVID-19 environment, there will be greater emphasis on the use of virtual technology in education, corporate activity, and many other areas. Supporting investments in this crucial aspect of infrastructure can enhance recovery and growth potential in many ways.

Get the Word Out

As demonstrated at length in this report, the Permian Basin is highly important to Texas and the US on many levels. In addition to supporting a significant component of the economy (particularly in Texas), production in the region generates substantial tax revenues. Policy goals such as those related to energy security and improvement in the balance of trade are also supported by the Permian Basin.

It is appropriate and, indeed, essential for State and federal government and major private stakeholders around the country to support this vital resource. This report provides the data to build the case regarding the benefits of ensuring the Permian Basin has sufficient resources for needed infrastructure and is otherwise maintained during the COVID-19 period and beyond.

An aggressive, privately funded marketing and advocacy campaign to get the word out could be an important aspect of securing needed support in Austin, in Washington, DC, and among private stakeholders.

Conclusion

The vast oil and natural gas reserves of the Permian Basin are a crucial energy resource for the region, the State, the nation, and the world. Production in the region enhances energy security and improves the US balance of trade.

The Permian Basin oil and gas industry also supports about 10% of the Texas economy when multiplier effects are considered and generated about $7.9 billion in State taxes in 2019 (including severance taxes), with another $5.9 billion in annual revenues to local taxing entities such as cities, counties, and school districts. The benefits of the Permian Basin are spread across Texas and beyond, creating jobs and opportunities for millions of people.

The Permian Basin oil and gas industry supports about 10% of the Texas economy when multiplier effects are considered and generated about $7.9 billion in State taxes in 2019 (including severance taxes), with another $5.9 billion in annual revenues to local taxing entities such as cities, counties, and school districts.

The current situation is threatening this crucial resource. In addition to the COVID-19 challenges faced globally, the turmoil in oil markets is causing substantial harms. Thoughtful efforts to mitigate this damage are critical to preserving the basic structure needed to ensure the region can return to growth in production once the worst virus issues are past and demand for oil and natural gas returns to more reasonable levels. An aggressive and focused response is imperative to both maintain the infrastructure of the local sector and secure the full potential of Odessa and the entire Permian Basin as the epicenter of efforts to meet future global energy needs.

Appendices

Appendix A: Methods Used

US Multi-Regional Impact Assessment System

The US Multi-Regional Impact Assessment (USMRIAS) measures multiplier effects of economic stimuli. The basic modeling technique employed in this study is known as dynamic input-output analysis, which essentially uses extensive survey data, industry information, and a variety of corroborative source materials to create a matrix describing the various goods and services (known as resources or inputs) required to produce one unit (a dollar's worth) of output for a given sector. Once the base information is compiled, it can be mathematically simulated to generate evaluations of the magnitude of successive rounds of activity involved in the overall production process.

There are two essential steps in conducting an input-output analysis once the system is operational. The first major endeavor is to accurately define the levels of direct activity to be evaluated. In this instance, multiple aspects of the energy sector were analyzed to determine related direct spending and employment related specifically to Permian Basin oil production. Input information was compiled by The Perryman Group from public sources and the firm's proprietary resources. Once the direct estimates were quantified, the resulting inputs were used in a simulation of the USMRIAS. The USMRIAS was also used to capture the interactions among sectors for the projections of the short-term outlooks provided in this report based on detailed examination of the likely effects in each of several hundred sectors. Effects of COVID-19 were estimated based on a variety of public and private source materials including, among others, data from sectors that have been particularly affected, information from areas where the pandemic spread earlier (as well as prior pandemics and natural disasters), performance patterns in other economic downturns and recoveries, and historical responses to oil price fluctuations.

Simulations of the input-output system were utilized to measure total overall economic effects of the various aspects of the energy sector. The present study was conducted within the context of the US Multi-Regional Impact Assessment System (USMRIAS) which was developed and is maintained by The Perryman Group. This model has been used in hundreds of diverse applications across the country and has an excellent reputation for accuracy and credibility; it has also been peer reviewed on multiple occasions. The systems used in the current simulations reflect the unique industrial structures of the US, Texas, Permian Basin, and Odessa (Ector County) economies.

The USMRIAS is somewhat similar in format to the Input-Output Model of the United States which is maintained by the US Department of Commerce. The model developed by TPG, however, incorporates several important enhancements and refinements.

Specifically, the expanded system includes (1) comprehensive 500-sector coverage for any county, multi-county, or urban region; (2) calculation of both total expenditures and value-added by industry and region; (3) direct estimation of expenditures for multiple basic input choices (expenditures, output, income, or employment); (4) extensive parameter localization; (5) price adjustments for real and nominal assessments by sectors and areas; (6) measurement of the induced impacts associated with payrolls and consumer spending; (7) embedded modules to estimate multi-sectoral direct spending effects; (8) estimation of retail spending activity by consumers; and (9) comprehensive linkage and integration capabilities with a wide variety of econometric, real estate, occupational, and fiscal impact models.

The impact assessment (input-output) process essentially estimates the amounts of all types of goods and services required to produce one unit (a dollar's worth) of a specific type of output. For purposes of illustrating the nature of the system, it is useful to think of inputs and outputs in dollar (rather than physical) terms. As an example, the construction of a new building will require specific dollar amounts of lumber, glass, concrete, hand tools, architectural services, interior design services, paint, plumbing, and numerous other elements. Each of these suppliers must, in turn, purchase additional dollar amounts of inputs. This process continues through multiple rounds of production, thus generating subsequent increments to business activity. The initial process of building the facility is known as the *direct effect*. The ensuing transactions in the output chain constitute the *indirect effect*.

Another pattern that arises in response to any direct economic activity comes from the payroll dollars received by employees at each stage of the production cycle. As workers are compensated, they use some of their income for taxes, savings, and purchases from external markets. A substantial portion, however, is spent locally on food, clothing, health care services, utilities, housing, recreation, and other items. Typical purchasing patterns in the relevant areas are obtained from the Center for Community and Economic Research *Cost of Living Index*, a privately compiled inter-regional measure which has been widely used for several decades, and the *Consumer Expenditure Survey* of the US Department of Labor. These initial outlays by area residents generate further secondary activity as local providers acquire inputs to meet this consumer demand. These consumer spending impacts are known as the *induced effect*. The USMRIAS is designed to provide realistic, yet conservative, estimates of these phenomena.

Sources for information used in this process include the Bureau of the Census, the Bureau of Labor Statistics, the Regional Economic Information System of the US Department of Commerce, and other public and private sources. The pricing data are compiled from the US Department of Labor and the US Department of Commerce. The verification and testing procedures make use of extensive public and private sources.

Impacts were measured in constant 2020 dollars to eliminate the effects of inflation.

The USMRIAS generates estimates of the effect on several measures of business activity. The most comprehensive measure of economic activity used in this study is **Total Expenditures**. This measure incorporates every dollar that changes hands in any transaction. For example, suppose a farmer sells wheat to a miller for $0.50; the miller then sells flour to a baker for $0.75; the baker, in turn, sells bread to a customer for $1.25. The Total Expenditures recorded in this instance would be $2.50, that is, $0.50 + $0.75 + $1.25. This measure is quite broad but is useful in that (1) it reflects the overall interplay of all industries in the economy, and (2) some key fiscal variables such as sales taxes are linked to aggregate spending.

A second measure of business activity frequently employed in this analysis is that of **Gross Product**. This indicator represents the regional equivalent of Gross Domestic Product, the most commonly reported statistic regarding national economic performance. In other words, the Gross Product of Texas is the amount of US output that is produced in that state; it is defined as the value of all final goods produced in a given region for a specific period of time. Stated differently, it captures the amount of value-added (gross area product) over intermediate goods and services at each stage of the production process, that is, it eliminates the double counting in the Total Expenditures concept. Using the example above, the Gross Product is $1.25 (the value of the bread) rather than $2.50. Alternatively, it may be viewed as the sum of the value-added by the farmer, $0.50; the miller, $0.25 ($0.75 - $0.50); and the baker, $0.50 ($1.25 - $0.75). The total value-added is, therefore, $1.25, which is equivalent to the final value of the bread. In many industries, the primary component of value-added is the wage and salary payments to employees.

The third gauge of economic activity used in this evaluation is **Personal Income**. As the name implies, Personal Income is simply the income received by individuals, whether in the form of wages, salaries, interest, dividends, proprietors' profits, or other sources. It may thus be viewed as the segment of overall impacts which flows directly to the citizenry.

The fourth measure, **Retail Sales**, represents the component of Total Expenditures which occurs in retail outlets (general merchandise stores, automobile dealers and service stations, building materials stores, food stores, drugstores, restaurants, and so forth). Retail Sales is a commonly used measure of consumer activity.

The final aggregates used are **Jobs and Job-Years,** which reflect the full-time equivalent jobs generated by an activity. For an economic stimulus expected to endure (such as the ongoing operations of a facility), the Jobs measure is used. It should be noted that, unlike the dollar values described above, Jobs is a "stock" rather than a "flow." In other words, if

an area produces $1 million in output in 2018 and $1 million in 2019, it is appropriate to say that $2 million was achieved in the 2018-19 period. If the same area has 100 people working in 2018 and 100 in 2019, it only has 100 Jobs. When a flow of jobs is measured, such as in a construction project or a cumulative assessment over multiple years, it is appropriate to measure employment in Job-Years (a person working for a year, though it could be multiple people working for partial years). This concept is distinct from Jobs, which anticipates that the relevant positions will be maintained on a continuing basis.

US Multi-Regional Econometric Model

Overview

The US Multi-Regional Econometric Model was developed by Dr. M. Ray Perryman, President and CEO of The Perryman Group (TPG), about 40 years ago and has been consistently maintained, expanded, and updated since that time. It is formulated in an internally consistent manner and is designed to permit the integration of relevant global, national, state, and local factors into the projection process. It is the result of four decades of continuing research in econometrics, economic theory, statistical methods, and key policy issues and behavioral patterns, as well as intensive, ongoing study of all aspects of the global, US, Texas, and Texas metropolitan area economies. It is extensively used by scores of federal and State governmental entities on an ongoing basis, as well as hundreds of major corporations. In the present analysis, it was integrated with the USMRIAS described above to measure the projected short-term effects of COVID-19 and the oil downturn on national, state, and local activity by detailed industrial sector.

This section describes the forecasting process in a comprehensive manner, focusing on both the modeling and the supplemental analysis. The overall methodology, while certainly not ensuring perfect foresight, permits an enormous body of relevant information to impact the economic outlook in a systematic manner.

Model Logic and Structure

The Model revolves around a core system which projects output (real and nominal), income (real and nominal), and employment by industry in a simultaneous manner. For purposes of illustration, it is useful to initially consider the employment functions. Essentially, employment within the system is a derived demand relationship obtained from a neo-Classical production function. The expressions are augmented to include dynamic temporal adjustments to changes in relative factor input costs, output and (implicitly) productivity, and technological progress over time. Thus, the typical equation includes output, the relative real cost of labor and capital, dynamic lag structures, and a technological adjustment parameter. The functional form is logarithmic, thus preserving the theoretical consistency with the neo-Classical formulation.

The income segment of the model is divided into wage and non-wage components. The wage equations, like their employment counterparts, are individually estimated at the 3-digit North American Industry Classification System (NAICS) level of aggregation. Hence, income by place of work is measured for approximately 90 production categories. The

wage equations measure real compensation, with the form of the variable structure differing between "basic" and "non-basic."

The basic industries, comprised primarily of the various components of Mining, Agriculture, and Manufacturing, are export-oriented, i.e., they bring external dollars into the area and form the core of the economy. The production of these sectors typically flows into national and international markets; hence, the labor markets are influenced by conditions in areas beyond the borders of the particular region. Thus, real (inflation-adjusted) wages in the basic industry are expressed as a function of the corresponding national rates, as well as measures of local labor market conditions (the reciprocal of the unemployment rate), dynamic adjustment parameters, and ongoing trends.

The "non-basic" sectors are somewhat different in nature, as the strength of their labor markets is linked to the health of the local export sectors. Consequently, wages in these industries are related to those in the basic segment of the economy. The relationship also includes the local labor market measures contained in the basic wage equations.

Note that compensation rates in the export or "basic" sectors provide a key element of the interaction of the regional economies with national and international market phenomena, while the "non-basic" or local industries are strongly impacted by area production levels. Given the wage and employment equations, multiplicative identities in each industry provide expressions for total compensation; these totals may then be aggregated to determine aggregate wage and salary income. Simple linkage equations are then estimated for the calculation of personal income by place of work.

The non-labor aspects of personal income are modeled at the regional level using straightforward empirical expressions relating to national performance, dynamic responses, and evolving temporal patterns. In some instances (such as dividends, rents, and others) national variables (for example, interest rates) directly enter the forecasting system. These factors have numerous other implicit linkages into the system resulting from their simultaneous interaction with other phenomena in national and international markets which are explicitly included in various expressions.

The output or gross area product expressions are also developed at the 3-digit NAICS level. Regional output for basic industries is linked to national performance in the relevant industries, local and national production in key related sectors, relative area and national labor costs in the industry, dynamic adjustment parameters, and ongoing changes in industrial interrelationships (driven by technological changes in production processes).

Output in the non-basic sectors is modeled as a function of basic production levels, output in related local support industries (if applicable), dynamic temporal adjustments,

and ongoing patterns. The inter-industry linkages are obtained from the input-output (impact assessment) system which is part of the overall integrated modeling structure maintained by The Perryman Group. Note that the dominant component of the econometric system involves the simultaneous estimation and projection of output (real and nominal), income (real and nominal), and employment at a disaggregated industrial level. This process, of necessity, also produces projections of regional price deflators by industry. These values are affected by both national pricing patterns and local cost variations and permit changes in prices to impact other aspects of economic behavior. Income is converted from real to nominal terms using Texas Consumer Price Index, which fluctuates in response to national pricing patterns and unique local phenomena.

Several other components of the model are critical to the forecasting process. The demographic module includes (1) a linkage equation between wage and salary (establishment) employment and household employment, (2) a labor force participation rate function, and (3) a complete population system with endogenous migration. Given household employment, labor force participation (which is a function of economic conditions and evolving patterns of worker preferences), and the working age population, the unemployment rate and level become identities.

The population system uses Census information, fertility rates, and life tables to determine the "natural" changes in population by age group. Migration, the most difficult segment of population dynamics to track, is estimated in relation to relative regional and extra-regional economic conditions over time. Because evolving economic conditions determine migration in the system, population changes are allowed to interact simultaneously with overall economic conditions. Through this process, migration is treated as endogenous to the system, thus allowing population to vary in accordance with relative business performance (particularly employment).

Real retail sales is related to income, interest rates, dynamic adjustments, and patterns in consumer behavior on a store group basis. It is expressed on an inflation-adjusted basis. Inflation at the state level relates to national patterns, indicators of relative economic conditions, and ongoing trends. As noted earlier, prices are endogenous to the system.

A final significant segment of the forecasting system relates to real estate absorption and activity. The short-term demand for various types of property is determined by underlying economic and demographic factors, with short-term adjustments to reflect the current status of the pertinent building cycle. In some instances, this portion of the forecast requires integration with the US Multi-Regional Industry-Occupation System which is maintained by The Perryman Group. This system also allows any employment simulation or forecast from the econometric model to be translated into a highly detailed occupational profile.

The overall US Multi-Regional Econometric Model contains numerous additional specifications, and individual expressions are modified to reflect alternative lag structures, empirical properties of the estimates, simulation requirements, and similar phenomena. Moreover, it is updated on an ongoing basis as new data releases become available. Nonetheless, the above synopsis offers a basic understanding of the overall structure and underlying logic of the system.

Model Simulation and Multi-Regional Structure

The initial phase of the simulation process is the execution of a standard non-linear algorithm for the state system and that of each of the individual sub-areas. The external assumptions are derived from scenarios developed through national and international models and extensive analysis by The Perryman Group.

Once the initial simulations are completed, they are merged into a single system with additive constraints and interregional flows. Using information on minimum regional requirements, import needs, export potential, and locations, it becomes possible to balance the various forecasts into a mathematically consistent set of results. This process is, in effect, a disciplining exercise with regard to the individual regional (including metropolitan and rural) systems. By compelling equilibrium across all regions and sectors, the algorithm ensures that the patterns in state activity are reasonable in light of smaller area dynamics and, conversely, that the regional outlooks are within plausible performance levels for the state as a whole.

The iterative simulation process has the additional property of imposing a global convergence criterion across the entire multi-regional system, with balance being achieved simultaneously on both a sectoral and a geographic basis. This approach is particularly critical on non-linear dynamic systems, as independent simulations of individual systems often yield unstable, non-convergent outcomes.

It should be noted that the underlying data for the modeling and simulation process are frequently updated and revised by the various public and private entities compiling them. Whenever those modifications to the database occur, they bring corresponding changes to the structural parameter estimates of the various systems and the solutions to the simulation and forecasting system. The multi-regional version of the econometric model is re-estimated and simulated with each such data release, thus providing a constantly evolving and current assessment of state and local business activity.

The Final Forecast

The process described above is followed to produce an initial set of projections. Through the comprehensive multi-regional modeling and simulation process, a systematic analysis

is generated which accounts for both historical patterns in economic performance and inter-relationships and best available information on the future course of pertinent external factors. While the best available techniques and data are employed in this effort, they are not capable of directly capturing "street sense," i.e., the contemporaneous and often non-quantifiable information that can materially affect economic outcomes. In order to provide a comprehensive approach to the prediction of business conditions, it is necessary to compile and assimilate extensive material regarding current events and factors both across the state of Texas and elsewhere.

This critical aspect of the forecasting methodology includes activities such as (1) daily review of hundreds of financial and business publications and electronic information sites; (2) review of major newspapers and online news sources in the state on a daily basis; (3) dozens of hours of direct telephone interviews with key business and political leaders in all parts of the state; (4) face-to-face discussions with representatives of major industry groups; and (5) frequent site visits to the various regions of the state. The insights arising from this "fact finding" are analyzed and evaluated for their effects on the likely course of the future activity.

Another vital information resource stems from the firm's ongoing interaction with key players in the international, domestic, and state economic scenes. Such activities include visiting with corporate groups on a regular basis and being regularly involved in the policy process at all levels. The firm is also an active participant in many major corporate relocations, economic development initiatives, and regulatory proceedings.

Once organized, this information is carefully assessed and, when appropriate, independently verified. The impact on specific communities and sectors that is distinct from what is captured by the econometric system is then factored into the forecast analysis. For example, the opening or closing of a major facility, particularly in a relatively small area, can cause a sudden change in business performance that will not be accounted for by either a modeling system based on historical relationships or expected (primarily national and international) factors.

The final step in the forecasting process is the integration of this material into the results in a logical and mathematically consistent manner. In some instances, this task is accomplished through "constant adjustment factors" which augment relevant equations. In other cases, anticipated changes in industrial structure or regulatory parameters are initially simulated within the context of the Multi-Regional Impact Assessment System to estimate their ultimate effects by sector. Those findings are then factored into the simulation as constant adjustments on a distributed temporal basis. Once this scenario is formulated, the extended system is again balanced across regions and sectors through an iterative simulation algorithm analogous to that described in the preceding section.

Appendix B: Detailed Results

Impact of the Permian Basin on the Texas Economy

The Annual Impact of Permian Basin Oil and Gas Activity On Business Activity in Texas –Oil and Gas Extraction				
Industry	**Total Expenditures**	**Gross Product**	**Personal Income**	**Jobs**
Agriculture	+$2.052 b	+$0.611 b	+$0.400 b	+5,885
Mining	+$130.708 b	+$31.671 b	+$4.248 b	+113,515
Utilities	+$7.938 b	+$1.776 b	+$0.775 b	+3,139
Construction	+$0.392 b	+$0.212 b	+$0.175 b	+2,291
Manufacturing	+$21.134 b	+$6.709 b	+$3.878 b	+$53,949
Wholesale Trade	+$4.953 b	+$3.347 b	+$1.930 b	+$20,481
Retail Trade	+$17.314 b	+$12.889 b	+$7.473 b	+217,090
Transportation and Warehousing	+$3.752 b	+$2.455 b	+$1.623 b	+20,672
Information	+$2.574 b	+$1.590 b	+$0.679 b	+5,684
Financial Activities	+$29.412 b	+$9.488 b	+$2.747 b	+25,604
Business Services	+$5.633 b	+$3.303 b	+$2.695 b	+30,632
Health Services	+$3.941 b	+$2.754 b	+$2.328 b	+35,929
Other Services	+$7.481 b	+$3.811 b	+$3.060 b	+68,544
Total	**+$237.285 b**	**+$80.616 b**	**+$32.011 b**	**603,414**

Source: US Multi-Regional Impact Assessment System, The Perryman Group
Notes: Monetary values given in billions of 2020 US dollars per year. Components may not sum due to rounding. Retail Trade includes Restaurants, Financial Activities includes Real Estate.

The Annual Impact of Permian Basin Oil and Gas Activity On Business Activity in Texas –Drilling Oil and Gas Wells				
Industry	**Total Expenditures**	**Gross Product**	**Personal Income**	**Jobs**
Agriculture	+$0.193 b	+$0.054 b	+$0.036 b	+525
Mining	+$4.411 b	+$1.752 b	+$1.432 b	+18,578
Utilities	+$0.569 b	+$0.128 b	+$0.056 b	+230
Construction	+$0.213 b	+$0.113 b	+$0.093 b	+1,224
Manufacturing	+$2.442 b	+$0.779 b	+$0.465 b	+6,563
Wholesale Trade	+$0.578 b	+$0.391 b	+$0.226 b	+2,397
Retail Trade	+$1.649 b	+$1.237 b	+$0.719 b	+20,614
Transportation and Warehousing	+$0.589 b	+$0.388 b	+$0.257 b	+3,271
Information	+$0.252 b	+$0.155 b	+$0.066 b	+556
Financial Activities	+$1.877 b	+$0.549 b	+$0.250 b	+2,553
Business Services	+$0.695 b	+$0.408 b	+$0.333 b	+3,788
Health Services	+$0.393 b	+$0.275 b	+$0.232 b	+3,586
Other Services	+$0.771 b	+$0.383 b	+$0.309 b	+6,931
Total	**+$14.633 b**	**+$6.614 b**	**+$4.473 b**	**+70,816**

Source: US Multi-Regional Impact Assessment System, The Perryman Group
Notes: Monetary values given in billions of 2020 US dollars per year. Components may not sum due to rounding. Retail Trade includes Restaurants, Financial Activities includes Real Estate.

The Annual Impact of Permian Basin Oil and Gas Activity On Business Activity in Texas –Oilfield Services				
Industry	**Total Expenditures**	**Gross Product**	**Personal Income**	**Jobs**
Agriculture	+$0.415 b	+$0.115 b	+$0.076 b	+1,120
Mining	+$9.513 b	+$5.118 b	+$4.187 b	+54,514
Utilities	+$1.201 b	+$0.270 b	+$0.118 b	+482
Construction	+$0.418 b	+$0.231 b	+$0.190 b	+2,494
Manufacturing	+$4.658 b	+$1.485 b	+$0.847 b	+12,200
Wholesale Trade	+$1.003 b	+$0.679 b	+$0.391 b	+4,150
Retail Trade	+$3.543 b	+$2.663 b	+$1.549 b	+44,272
Transportation and Warehousing	+$0.765 b	+$0.506 b	+$0.335 b	+4,263
Information	+$0.480 b	+$0.297 b	+$0.127 b	+1,060
Financial Activities	+$3.474 b	+$0.840 b	+$0.338 b	+3,316
Business Services	+$0.830 b	+$0.491 b	+$0.401 b	+4,545
Health Services	+$0.849 b	+$0.595 b	+$0.503 b	+7,769
Other Services	+$1.516 b	+$0.782 b	+$0.628 b	+14,110
Total	**+$28.665 b**	**+$14.073 b**	**+$9.691 b**	**+154,295**

Source: US Multi-Regional Impact Assessment System, The Perryman Group
Notes: Monetary values given in billions of 2020 US dollars per year. Components may not sum due to rounding. Retail Trade includes Restaurants, Financial Activities includes Real Estate.

The Annual Impact of Permian Basin Oil and Gas Activity On Business Activity in Texas –Pipeline Construction and Development				
Industry	**Total Expenditures**	**Gross Product**	**Personal Income**	**Jobs**
Agriculture	+$0.050 b	+$0.014 b	+$0.010 b	+140
Mining	+$0.045 b	+$0.011 b	+$0.006 b	+35
Utilities	+$0.141 b	+$0.032 b	+$0.014 b	+57
Construction	+$0.995 b	+$0.456 b	+$0.376 b	+4,933
Manufacturing	+$0.587 b	+$0.194 b	+$0.115 b	+1,713
Wholesale Trade	+$0.133 b	+$0.090 b	+$0.052 b	+549
Retail Trade	+$0.422 b	+$0.317 b	+$0.184 b	+5,278
Transportation and Warehousing	+$0.100 b	+$0.066 b	+$0.044 b	+556
Information	+$0.063 b	+$0.039 b	+$0.017 b	+138
Financial Activities	+$0.422 b	+$0.105 b	+$0.043 b	+425
Business Services	+$0.292 b	+$0.188 b	+$0.153 b	+1,744
Health Services	+$0.101 b	+$0.070 b	+$0.060 b	+920
Other Services	+$0.191 b	+$0.097 b	+$0.078 b	+1,750
Total	**+$3.541 b**	**+$1.680 b**	**+$1.151 b**	**+18,237**

Source: US Multi-Regional Impact Assessment System, The Perryman Group
Notes: Monetary values given in billions of 2020 US dollars per year. Components may not sum due to rounding. Retail Trade includes Restaurants, Financial Activities includes Real Estate.

The Annual Impact of Permian Basin Oil and Gas Activity On Business Activity in Texas – Durable Manufacturing				
Industry	**Total Expenditures**	**Gross Product**	**Personal Income**	**Jobs**
Agriculture	+$0.283 b	+$0.079 b	+$0.052 b	+766
Mining	+$0.260 b	+$0.062 b	+$0.037 b	+204
Utilities	+$0.926 b	+$0.208 b	+$0.091 b	+367
Construction	+$0.352 b	+$0.189 b	+$0.156 b	+2,048
Manufacturing	+$12.473 b	+$4.478 b	+$2.988 b	+37,868
Wholesale Trade	+$1.019 b	+$0.690 b	+$0.398 b	+4,217
Retail Trade	+$2.412 b	+$1.803 b	+$1.047 b	+30,205
Transportation and Warehousing	+$0.576 b	+$0.384 b	+$0.254 b	+3,234
Information	+$0.423 b	+$0.261 b	+$0.112 b	+936
Financial Activities	+$2.378 b	+$0.594 b	+$0.243 b	+2,374
Business Services	+$0.757 b	+$0.454 b	+$0.371 b	+4,216
Health Services	+$0.566 b	+$0.397 b	+$0.335 b	+5,181
Other Services	+$1.038 b	+$0.534 b	+$0.429 b	+9,616
Total	**+$23.464 b**	**+$10.134 b**	**+$6.512 b**	**+101,231**

Source: US Multi-Regional Impact Assessment System, The Perryman Group
Notes: Monetary values given in billions of 2020 US dollars per year. Components may not sum due to rounding. Retail Trade includes Restaurants, Financial Activities includes Real Estate.

The Annual Impact of Permian Basin Oil and Gas Activity On Business Activity in Texas – Pipeline Operations				
Industry	**Total Expenditures**	**Gross Product**	**Personal Income**	**Jobs**
Agriculture	+$0.090 b	+$0.026 b	+$0.017 b	+393
Mining	+$0.225 b	+$0.053 b	+$0.030 b	+243
Utilities	+$0.781 b	+$0.182 b	+$0.079 b	+535
Construction	+$0.417 b	+$0.210 b	+$0.173 b	+3,438
Manufacturing	+$0.940 b	+$0.290 b	+$0.165 b	+3,828
Wholesale Trade	+$0.220 b	+$0.149 b	+$0.086 b	+1,440
Retail Trade	+$0.777 b	+$0.584 b	+$0.339 b	+14,554
Transportation and Warehousing	+$4.365 b	+$0.969 b	+$0.641 b	+12,188
Information	+$0.123 b	+$0.076 b	+$0.032 b	+415
Financial Activities	+$0.850 b	+$0.236 b	+$0.100 b	+1,528
Business Services	+$0.232 b	+$0.141 b	+$0.115 b	+2,042
Health Services	+$0.179 b	+$0.125 b	+$0.106 b	+2,475
Other Services	+$0.357 b	+$0.180 b	+$0.144 b	+5,012
Total	**+$9.556 b**	**+$3.221 b**	**+$2.028 b**	**+48,091**

Source: US Multi-Regional Impact Assessment System, The Perryman Group
Notes: Monetary values given in billions of 2020 US dollars per year. Components may not sum due to rounding. Retail Trade includes Restaurants, Financial Activities includes Real Estate.

The Annual Impact of Permian Basin Oil and Gas Activity On Business Activity in Texas – Refinery Operations				
Industry	**Total Expenditures**	**Gross Product**	**Personal Income**	**Jobs**
Agriculture	+$0.586 b	+$0.175 b	+$0.114 b	+1,678
Mining	+$0.855 b	+$0.217 b	+$0.125 b	+784
Utilities	+$3.486 b	+$0.731 b	+$0.319 b	+1,294
Construction	+$0.011 b	+$0.005 b	+$0.003 b	+27
Manufacturing	+$50.139 b	+$5.383 b	+$2.726 b	+26,941
Wholesale Trade	+$1.875 b	+$1.267 b	+$0.731 b	+7,754
Retail Trade	+$4.912 b	+$3.648 b	+$2.115 b	+61,392
Transportation and Warehousing	+$2.586 b	+$1.205 b	+$0.797 b	+10,152
Information	+$0.866 b	+$0.536 b	+$0.229 b	+1,916
Financial Activities	+$6.639 b	+$2.042 b	+$0.707 b	+6,692
Business Services	+$1.826 b	+$1.070 b	+$0.873 b	+9,926
Health Services	+$1.108 b	+$0.777 b	+$0.657 b	+10,133
Other Services	+$2.141 b	+$1.090 b	+$0.876 b	+19,639
Total	**+$77.030 b**	**+$18.148 b**	**+$10.273 b**	**+158,328**

Source: US Multi-Regional Impact Assessment System, The Perryman Group
Notes: Monetary values given in billions of 2020 US dollars per year. Components may not sum due to rounding. Retail Trade includes Restaurants, Financial Activities includes Real Estate.

The Annual Impact of Permian Basin Oil and Gas Activity On Business Activity in Texas – Petrochemical Operations				
Industry	**Total Expenditures**	**Gross Product**	**Personal Income**	**Jobs**
Agriculture	+$0.881 b	+$0.263 b	+$0.175 b	+2,581
Mining	+$0.791 b	+$0.256 b	+$0.178 b	+1,523
Utilities	+$4.838 b	+$1.040 b	+$0.454 b	+1,846
Construction	+$0.007 b	+$0.003 b	+$0.002 b	+17
Manufacturing	+$40.930 b	+$13.162 b	+$6.427 b	+55,117
Wholesale Trade	+$2.699 b	+$1.827 b	+$1.053 b	+11,179
Retail Trade	+$6.509 b	+$4.845 b	+$2.810 b	+81,443
Transportation and Warehousing	+$2.587 b	+$1.648 b	+$1.090 b	+13,878
Information	+$1.024 b	+$0.632 b	+$0.270 b	+2,258
Financial Activities	+$6.675 b	+$1.757 b	+$0.690 b	+6,701
Business Services	+$2.356 b	+$1.411 b	+$1.151 b	+13,081
Health Services	+$1.486 b	+$1.040 b	+$0.879 b	+13,579
Other Services	+$2.815 b	+$1.450 b	+$1.161 b	+26,078
Total	**+$73.598 b**	**+$29.333 b**	**+$16.341 b**	**+229,281**

Source: US Multi-Regional Impact Assessment System, The Perryman Group
Notes: Monetary values given in billions of 2020 US dollars per year. Components may not sum due to rounding. Retail Trade includes Restaurants, Financial Activities includes Real Estate.

The Annual Impact of Permian Basin Oil and Gas Activity On Business Activity in Texas - Composite				
Industry	**Total Expenditures**	**Gross Product**	**Personal Income**	**Jobs**
Agriculture	+$4.550 b	+$1.337 b	+$0.880 b	+13,088
Mining	+$146.807 b	+$39.140 b	+$10.243 b	+189,396
Utilities	+$19.881 b	+$4.366 b	+$1.905 b	+7,949
Construction	+$2.805 b	+$1.420 b	+$1.169 b	+16,473
Manufacturing	+$133.303 b	+$32.481 b	+$17.611 b	+198,178
Wholesale Trade	+$12.480 b	+$8.439 b	+$4.866 b	+52,166
Retail Trade	+$37.540 b	+$27.985 b	+$16.237 b	+474,847
Transportation and Warehousing	+$15.320 b	+$7.622 b	+$5.041 b	+68,214
Information	+$5.805 b	+$3.586 b	+$1.531 b	+12,963
Financial Activities	+$51.726 b	+$15.612 b	+$5.120 b	+49,194
Business Services	+$12.621 b	+$7.467 b	+$6.091 b	+69,973
Health Services	+$8.623 b	+$6.032 b	+$5.101 b	+79,570
Other Services	+$16.310 b	+$8.329 b	+$6.685 b	+151,681
Total	**+$467.771 b**	**+$163.817 b**	**+$82.480 b**	**+1,383,693**

Source: US Multi-Regional Impact Assessment System, The Perryman Group
Notes: Monetary values given in billions of 2020 US dollars per year. Components may not sum due to rounding. Retail Trade includes Restaurants, Financial Activities includes Real Estate.

Impact of the Permian Basin on the US Economy

The Annual Impact of Permian Basin Oil and Gas Activity On Business Activity in the United States –Oil and Gas Extraction				
Industry	**Total Expenditures**	**Gross Product**	**Personal Income**	**Jobs**
Agriculture	+$2.367 b	+$0.723 b	+$0.466 b	+6,835
Mining	+$130.790 b	+$31.696 b	+$4.273 b	+113,680
Utilities	+$10.368 b	+$2.320 b	+$1.012 b	+4,100
Construction	+$0.413 b	+$0.223 b	+$0.184 b	+2,412
Manufacturing	+$36.149 b	+$10.656 b	+$5.991 b	+84,408
Wholesale Trade	+$5.101 b	+$3.447 b	+$1.988 b	+21,093
Retail Trade	+$17.943 b	+$13.344 b	+$7.734 b	+225,026
Transportation and Warehousing	+$4.188 b	+$2.740 b	+$1.812 b	+23,074
Information	+$2.700 b	+$1.668 b	+$0.712 b	+5,962
Financial Activities	+$29.807 b	+$9.715 b	+$2.881 b	+26,885
Business Services	+$5.836 b	+$3.422 b	+$2.792 b	+31,734
Health Services	+$4.014 b	+$2.805 b	+$2.372 b	+36,598
Other Services	+$8.000 b	+$4.052 b	+$3.264 b	+73,260
Total	**+$257.677 b**	**+$86.810 b**	**+$35.479 b**	**+655,066**

Source: US Multi-Regional Impact Assessment System, The Perryman Group
Notes: Monetary values given in billions of 2020 US dollars per year. Components may not sum due to rounding. Retail Trade includes Restaurants, Financial Activities includes Real Estate.

The Annual Impact of Permian Basin Oil and Gas Activity On Business Activity in the United States –Drilling Oil and Gas Wells				
Industry	**Total Expenditures**	**Gross Product**	**Personal Income**	**Jobs**
Agriculture	+$0.223 b	+$0.063 b	+$0.041 b	+605
Mining	+$4.421 b	+$1.755 b	+$1.434 b	+18,596
Utilities	+$0.744 b	+$0.168 b	+$0.073 b	+301
Construction	+$0.224 b	+$0.119 b	+$0.098 b	+1,289
Manufacturing	+$3.983 b	+$1.192 b	+$0.692 b	+9,855
Wholesale Trade	+$0.596 b	+$0.403 b	+$0.232 b	+2,468
Retail Trade	+$1.708 b	+$1.280 b	+$0.744 b	+21,359
Transportation and Warehousing	+$0.657 b	+$0.433 b	+$0.287 b	+3,651
Information	+$0.264 b	+$0.163 b	+$0.069 b	+583
Financial Activities	+$1.923 b	+$0.576 b	+$0.266 b	+2,715
Business Services	+$0.721 b	+$0.423 b	+$0.345 b	+3,925
Health Services	+$0.400 b	+$0.280 b	+$0.237 b	+3,653
Other Services	+$0.826 b	+$0.408 b	+$0.330 b	+7,416
Total	**+$16.690 b**	**+$7.263 b**	**+$4.849 b**	**+76,417**

Source: US Multi-Regional Impact Assessment System, The Perryman Group
Notes: Monetary values given in billions of 2020 US dollars per year. Components may not sum due to rounding. Retail Trade includes Restaurants, Financial Activities includes Real Estate.

The Annual Impact of Permian Basin Oil and Gas Activity On Business Activity in the United States –Oilfield Services				
Industry	**Total Expenditures**	**Gross Product**	**Personal Income**	**Jobs**
Agriculture	+$0.479 b	+$0.134 b	+$0.088 b	+1,291
Mining	+$9.531 b	+$5.125 b	+$4.193 b	+54,551
Utilities	+$1.569 b	+$0.353 b	+$0.154 b	+629
Construction	+$0.440 b	+$0.243 b	+$0.200 b	+2,625
Manufacturing	+$7.772 b	+$2.304 b	+$1.285 b	+18,607
Wholesale Trade	+$1.033 b	+$0.699 b	+$0.403 b	+4,274
Retail Trade	+$3.670 b	+$2.756 b	+$1.602 b	+45,870
Transportation and Warehousing	+$0.854 b	+$0.565 b	+$0.373 b	+4,759
Information	+$0.503 b	+$0.311 b	+$0.133 b	+1,112
Financial Activities	+$3.539 b	+$0.877 b	+$0.360 b	+3,527
Business Services	+$0.859 b	+$0.509 b	+$0.415 b	+4,708
Health Services	+$0.865 b	+$0.606 b	+$0.513 b	+7,914
Other Services	+$1.619 b	+$0.831 b	+$0.669 b	+15,070
Total	**+$32.735 b**	**+$15.313 b**	**+$10.389 b**	**+164,937**

Source: US Multi-Regional Impact Assessment System, The Perryman Group
Notes: Monetary values given in billions of 2020 US dollars per year. Components may not sum due to rounding. Retail Trade includes Restaurants, Financial Activities includes Real Estate.

The Annual Impact of Permian Basin Oil and Gas Activity On Business Activity in the United States –Pipeline Construction and Development				
Industry	**Total Expenditures**	**Gross Product**	**Personal Income**	**Jobs**
Agriculture	+$0.058 b	+$0.017 b	+$0.011 b	+162
Mining	+$0.047 b	+$0.011 b	+$0.007 b	+38
Utilities	+$0.184 b	+$0.042 b	+$0.018 b	+74
Construction	+$1.011 b	+$0.463 b	+$0.382 b	+5,013
Manufacturing	+$0.966 b	+$0.298 b	+$0.172 b	+2,573
Wholesale Trade	+$0.136 b	+$0.092 b	+$0.053 b	+565
Retail Trade	+$0.437 b	+$0.328 b	+$0.191 b	+5,469
Transportation and Warehousing	+$0.112 b	+$0.074 b	+$0.049 b	+621
Information	+$0.066 b	+$0.041 b	+$0.017 b	+145
Financial Activities	+$0.430 b	+$0.110 b	+$0.046 b	+453
Business Services	+$0.302 b	+$0.195 b	+$0.159 b	+1,806
Health Services	+$0.102 b	+$0.072 b	+$0.061 b	+937
Other Services	+$0.204 b	+$0.103 b	+$0.083 b	+1,870
Total	**+$4.057 b**	**+$1.846 b**	**+$1.249 b**	**+19,725**

Source: US Multi-Regional Impact Assessment System, The Perryman Group
Notes: Monetary values given in billions of 2020 US dollars per year. Components may not sum due to rounding. Retail Trade includes Restaurants, Financial Activities includes Real Estate.

The Annual Impact of Permian Basin Oil and Gas Activity On Business Activity in the United States – Durable Manufacturing				
Industry	**Total Expenditures**	**Gross Product**	**Personal Income**	**Jobs**
Agriculture	+$0.327 b	+$0.093 b	+$0.061 b	+885
Mining	+$0.273 b	+$0.066 b	+$0.040 b	+228
Utilities	+$1.209 b	+$0.271 b	+$0.118 b	+479
Construction	+$0.370 b	+$0.199 b	+$0.164 b	+2,156
Manufacturing	+$17.257 b	+$6.037 b	+$3.980 b	+50,940
Wholesale Trade	+$1.049 b	+$0.710 b	+$0.409 b	+4,343
Retail Trade	+$2.500 b	+$1.866 b	+$1.083 b	+31,303
Transportation and Warehousing	+$0.643 b	+$0.429 b	+$0.284 b	+3,610
Information	+$0.444 b	+$0.274 b	+$0.117 b	+981
Financial Activities	+$2.426 b	+$0.621 b	+$0.259 b	+2,528
Business Services	+$0.784 b	+$0.471 b	+$0.384 b	+4,368
Health Services	+$0.577 b	+$0.404 b	+$0.342 b	+5,277
Other Services	+$1.109 b	+$0.567 b	+$0.457 b	+10,271
Total	**+$28.967 b**	**+$12.010 b**	**+$7.699 b**	**+117,369**

Source: US Multi-Regional Impact Assessment System, The Perryman Group
Notes: Monetary values given in billions of 2020 US dollars per year. Components may not sum due to rounding. Retail Trade includes Restaurants, Financial Activities includes Real Estate.

The Annual Impact of Permian Basin Oil and Gas Activity On Business Activity in the United States – Pipeline Operations				
Industry	**Total Expenditures**	**Gross Product**	**Personal Income**	**Jobs**
Agriculture	+$0.103 b	+$0.031 b	+$0.020 b	+454
Mining	+$0.233 b	+$0.055 b	+$0.033 b	+270
Utilities	+$1.020 b	+$0.237 b	+$0.103 b	+699
Construction	+$0.439 b	+$0.221 b	+$0.182 b	+3,620
Manufacturing	+$1.563 b	+$0.448 b	+$0.249 b	+5,934
Wholesale Trade	+$0.227 b	+$0.154 b	+$0.089 b	+1,484
Retail Trade	+$0.805 b	+$0.604 b	+$0.351 b	+15,081
Transportation and Warehousing	+$4.872 b	+$1.082 b	+$0.715 b	+13,604
Information	+$0.129 b	+$0.080 b	+$0.034 b	+435
Financial Activities	+$0.870 b	+$0.248 b	+$0.106 b	+1,632
Business Services	+$0.241 b	+$0.146 b	+$0.119 b	+2,115
Health Services	+$0.182 b	+$0.127 b	+$0.108 b	+2,521
Other Services	+$0.381 b	+$0.192 b	+$0.154 b	+5,352
Total	**+$11.066 b**	**+$3.624 b**	**+$2.264 b**	**+53,201**

Source: US Multi-Regional Impact Assessment System, The Perryman Group
Notes: Monetary values given in billions of 2020 US dollars per year. Components may not sum due to rounding. Retail Trade includes Restaurants, Financial Activities includes Real Estate.

The Annual Impact of Permian Basin Oil and Gas Activity On Business Activity in the United States – Refinery Operations				
Industry	**Total Expenditures**	**Gross Product**	**Personal Income**	**Jobs**
Agriculture	+$0.677 b	+$0.207 b	+$0.133 b	+1,952
Mining	+$0.885 b	+$0.226 b	+$0.133 b	+839
Utilities	+$4.554 b	+$0.954 b	+$0.417 b	+1,691
Construction	+$0.012 b	+$0.005 b	+$0.004 b	+28
Manufacturing	+$80.475 b	+$8.538 b	+$4.276 b	+42,169
Wholesale Trade	+$1.931 b	+$1.305 b	+$0.753 b	+7,986
Retail Trade	+$5.090 b	+$3.776 b	+$2.189 b	+63,634
Transportation and Warehousing	+$2.886 b	+$1.346 b	+$0.890 b	+11,332
Information	+$0.908 b	+$0.563 b	+$0.240 b	+2,010
Financial Activities	+$6.763 b	+$2.114 b	+$0.750 b	+7,093
Business Services	+$1.892 b	+$1.109 b	+$0.905 b	+10,283
Health Services	+$1.129 b	+$0.791 b	+$0.669 b	+10,322
Other Services	+$2.290 b	+$1.160 b	+$0.935 b	+20,998
Total	**+$109.491 b**	**+$22.094 b**	**+$12.293 b**	**+180,337**

Source: US Multi-Regional Impact Assessment System, The Perryman Group
Notes: Monetary values given in billions of 2020 US dollars per year. Components may not sum due to rounding. Retail Trade includes Restaurants, Financial Activities includes Real Estate.

The Annual Impact of Permian Basin Oil and Gas Activity On Business Activity in the United States – Petrochemical Operations				
Industry	**Total Expenditures**	**Gross Product**	**Personal Income**	**Jobs**
Agriculture	+$1.016 b	+$0.308 b	+$0.203 b	+2,979
Mining	+$0.893 b	+$0.288 b	+$0.204 b	+1,729
Utilities	+$6.319 b	+$1.358 b	+$0.593 b	+2,411
Construction	+$0.007 b	+$0.003 b	+$0.002 b	+18
Manufacturing	+$66.117 b	+$20.945 b	+$10.171 b	+87,122
Wholesale Trade	+$2.779 b	+$1.881 b	+$1.085 b	+11,514
Retail Trade	+$6.745 b	+$5.015 b	+$2.908 b	+84,415
Transportation and Warehousing	+$2.888 b	+$1.840 b	+$1.217 b	+15,492
Information	+$1.075 b	+$0.663 b	+$0.283 b	+2,369
Financial Activities	+$6.807 b	+$1.832 b	+$0.734 b	+7,126
Business Services	+$2.441 b	+$1.461 b	+$1.192 b	+13,552
Health Services	+$1.514 b	+$1.060 b	+$0.896 b	+13,832
Other Services	+$3.007 b	+$1.540 b	+$1.238 b	+27,849
Total	**+$101.607 b**	**+$38.194 b**	**+$20.726 b**	**+270,406**

Source: US Multi-Regional Impact Assessment System, The Perryman Group
Notes: Monetary values given in billions of 2020 US dollars per year. Components may not sum due to rounding. Retail Trade includes Restaurants, Financial Activities includes Real Estate.

The Annual Impact of Permian Basin Oil and Gas Activity On Business Activity in the United States - Composite				
Industry	**Total Expenditures**	**Gross Product**	**Personal Income**	**Jobs**
Agriculture	+$5.249 b	+$1.576 b	+$1.024 b	+15,163
Mining	+$147.073 b	+$39.223 b	+$10.318 b	+189,931
Utilities	+$25.967 b	+$5.703 b	+$2.489 b	+10,383
Construction	+$2.916 b	+$1.478 b	+$1.217 b	+17,160
Manufacturing	+$214.283 b	+$50.417 b	+$26.817 b	+301,608
Wholesale Trade	+$12.853 b	+$8.692 b	+$5.012 b	+53,727
Retail Trade	+$38.899 b	+$28.969 b	+$16.802 b	+492,157
Transportation and Warehousing	+$17.101 b	+$8.508 b	+$5.627 b	+76,143
Information	+$6.089 b	+$3.762 b	+$1.606 b	+13,598
Financial Activities	+$52.565 b	+$16.092 b	+$5.402 b	+51,959
Business Services	+$13.075 b	+$7.736 b	+$6.311 b	+72,491
Health Services	+$8.784 b	+$6.145 b	+$5.196 b	+81,053
Other Services	+$17.436 b	+$8.853 b	+$7.129 b	+162,085
Total	**+$562.292 b**	**+$187.154 b**	**+$94.947 b**	**+1,537,458**

Source: US Multi-Regional Impact Assessment System, The Perryman Group
Notes: Monetary values given in billions of 2020 US dollars per year. Components may not sum due to rounding. Retail Trade includes Restaurants, Financial Activities includes Real Estate.

Cumulative Impact of the Permian Basin on the Texas and US Economies Through 2030 Under Varying Oil Price Scenarios

The Annual Impact of Permian Basin Oil and Gas Activity On Business Activity in Texas - Composite: Baseline Scenario 40% Probability; $55-$65 per Barrel Range on Average				
Industry	**Total Expenditures**	**Gross Product**	**Personal Income**	**Jobs**
Agriculture	+$6.234 b	+$1.832 b	+$1.206 b	+15,863
Mining	+$201.141 b	+$53.626 b	+$14.034 b	+229,551
Utilities	+$27.239 b	+$5.982 b	+$2.610 b	+9,634
Construction	+$3.843 b	+$1.945 b	+$1.601 b	+19,965
Manufacturing	+$182.640 b	+$44.502 b	+$24.130 b	+240,195
Wholesale Trade	+$17.099 b	+$11.563 b	+$6.667 b	+63,227
Retail Trade	+$51.433 b	+$38.343 b	+$22.246 b	+575,522
Transportation and Warehousing	+$20.991 b	+$10.443 b	+$6.906 b	+82,677
Information	+$7.953 b	+$4.914 b	+$2.098 b	+15,711
Financial Activities	+$70.870 b	+$21.390 b	+$7.015 b	+59,624
Business Services	+$17.292 b	+$10.231 b	+$8.346 b	+84,809
Health Services	+$11.815 b	+$8.265 b	+$6.988 b	+96,440
Other Services	+$22.347 b	+$11.412 b	+$9.159 b	+183,840
Total	**+$640.896 b**	**+$224.447 b**	**+$113.006 b**	**+1,677,058**

Source: US Multi-Regional Impact Assessment System, The Perryman Group
Notes: Monetary values given in billions of 2020 US dollars per year. Components may not sum due to rounding. Retail Trade includes Restaurants, Financial Activities includes Real Estate.

The Annual Impact of Permian Basin Oil and Gas Activity On Business Activity in Texas - Composite: Low Scenario

25% Probability; $45-$55 per Barrel Range on Average

Industry	Total Expenditures	Gross Product	Personal Income	Jobs
Agriculture	+$5.297 b	+$1.556 b	+$1.024 b	+13,478
Mining	+$170.909 b	+$45.566 b	+$11.925 b	+195,049
Utilities	+$23.145 b	+$5.083 b	+$2.218 b	+8,186
Construction	+$3.265 b	+$1.653 b	+$1.361 b	+16,964
Manufacturing	+$155.188 b	+$37.813 b	+$20.503 b	+204,093
Wholesale Trade	+$14.529 b	+$9.825 b	+$5.665 b	+53,723
Retail Trade	+$43.703 b	+$32.580 b	+$18.902 b	+489,020
Transportation and Warehousing	+$17.836 b	+$8.873 b	+$5.868 b	+70,250
Information	+$6.758 b	+$4.175 b	+$1.782 b	+13,350
Financial Activities	+$60.218 b	+$18.175 b	+$5.960 b	+50,662
Business Services	+$14.693 b	+$8.693 b	+$7.091 b	+72,062
Health Services	+$10.039 b	+$7.023 b	+$5.938 b	+81,945
Other Services	+$18.988 b	+$9.696 b	+$7.782 b	+156,209
Total	**+$544.568 b**	**+$190.712 b**	**+$96.021 b**	**+1,424,992**

Source: US Multi-Regional Impact Assessment System, The Perryman Group
Notes: Monetary values given in billions of 2020 US dollars per year. Components may not sum due to rounding. Retail Trade includes Restaurants, Financial Activities includes Real Estate.

The Annual Impact of Permian Basin Oil and Gas Activity On Business Activity in Texas- Composite: High Scenario

30% Probability; above $70 per Barrel on Average

Industry	Total Expenditures	Gross Product	Personal Income	Jobs
Agriculture	+$8.438 b	+$2.479 b	+$1.632 b	+21,470
Mining	+$272.249 b	+$72.584 b	+$18.996 b	+310,702
Utilities	+$36.868 b	+$8.097 b	+$3.533 b	+13,040
Construction	+$5.201 b	+$2.633 b	+$2.167 b	+27,023
Manufacturing	+$247.207 b	+$60.235 b	+$32.660 b	+325,109
Wholesale Trade	+$23.144 b	+$15.651 b	+$9.024 b	+85,578
Retail Trade	+$69.616 b	+$51.897 b	+$30.110 b	+778,981
Transportation and Warehousing	+$28.411 b	+$14.134 b	+$9.348 b	+111,905
Information	+$10.765 b	+$6.651 b	+$2.839 b	+21,266
Financial Activities	+$95.924 b	+$28.952 b	+$9.495 b	+80,702
Business Services	+$23.405 b	+$13.848 b	+$11.296 b	+114,791
Health Services	+$15.992 b	+$11.187 b	+$9.459 b	+130,533
Other Services	+$30.247 b	+$15.446 b	+$12.397 b	+248,832
Total	**+$867.466 b**	**+$303.794 b**	**+$152.957 b**	**+2,269,933**

Source: US Multi-Regional Impact Assessment System, The Perryman Group
Notes: Monetary values given in billions of 2020 US dollars per year. Components may not sum due to rounding. Retail Trade includes Restaurants, Financial Activities includes Real Estate.

The Annual Impact of Permian Basin Oil and Gas Activity On Business Activity in Texas- Composite: Very Low Scenario

5% Probability; $25-$35 per Barrel Range on Average

Industry	Total Expenditures	Gross Product	Personal Income	Jobs
Agriculture	+$2.889 b	+$0.849 b	+$0.559 b	+7,351
Mining	+$93.214 b	+$24.852 b	+$6.504 b	+106,380
Utilities	+$12.623 b	+$2.772 b	+$1.210 b	+4,465
Construction	+$1.781 b	+$0.901 b	+$0.742 b	+9,252
Manufacturing	+$84.640 b	+$20.623 b	+$11.182 b	+111,312
Wholesale Trade	+$7.924 b	+$5.359 b	+$3.090 b	+29,301
Retail Trade	+$23.835 b	+$17.769 b	+$10.309 b	+266,711
Transportation and Warehousing	+$9.728 b	+$4.839 b	+$3.201 b	+38,314
Information	+$3.686 b	+$2.277 b	+$0.972 b	+7,281
Financial Activities	+$32.843 b	+$9.913 b	+$3.251 b	+27,631
Business Services	+$8.014 b	+$4.741 b	+$3.868 b	+39,302
Health Services	+$5.475 b	+$3.830 b	+$3.239 b	+44,693
Other Services	+$10.356 b	+$5.288 b	+$4.244 b	+85,196
Total	**+$297.007 b**	**+$104.014 b**	**+$52.370 b**	**+777,190**

Source: US Multi-Regional Impact Assessment System, The Perryman Group
Notes: Monetary values given in billions of 2020 US dollars per year. Components may not sum due to rounding. Retail Trade includes Restaurants, Financial Activities includes Real Estate.

The Annual Impact of Permian Basin Oil and Gas Activity On Business Activity in the United States - Composite: Baseline Scenario

40% Probability; $55-$65 per Barrel Range on Average

Industry	Total Expenditures	Gross Product	Personal Income	Jobs
Agriculture	+$7.192 b	+$2.159 b	+$1.403 b	+18,377
Mining	+$201.506 b	+$53.739 b	+$14.136 b	+230,200
Utilities	+$35.578 b	+$7.814 b	+$3.410 b	+12,584
Construction	+$3.995 b	+$2.025 b	+$1.667 b	+20,799
Manufacturing	+$293.590 b	+$69.077 b	+$36.742 b	+365,554
Wholesale Trade	+$17.610 b	+$11.909 b	+$6.867 b	+65,118
Retail Trade	+$53.295 b	+$39.691 b	+$23.021 b	+596,502
Transportation and Warehousing	+$23.430 b	+$11.657 b	+$7.709 b	+92,287
Information	+$8.343 b	+$5.154 b	+$2.201 b	+16,481
Financial Activities	+$72.020 b	+$22.048 b	+$7.402 b	+62,975
Business Services	+$17.914 b	+$10.599 b	+$8.646 b	+87,861
Health Services	+$12.035 b	+$8.419 b	+$7.119 b	+98,238
Other Services	+$23.890 b	+$12.130 b	+$9.767 b	+196,450
Total	**+$770.399 b**	**+$256.421 b**	**+$130.088 b**	**+1,863,424**

Source: US Multi-Regional Impact Assessment System, The Perryman Group
Notes: Monetary values given in billions of 2020 US dollars per year. Components may not sum due to rounding. Retail Trade includes Restaurants, Financial Activities includes Real Estate.

The Annual Impact of Permian Basin Oil and Gas Activity On Business Activity in the United States - Composite: Low Scenario

25% Probability; $45-$55 per Barrel Range on Average

Industry	Total Expenditures	Gross Product	Personal Income	Jobs
Agriculture	+$6.111 b	+$1.835 b	+$1.192 b	+15,615
Mining	+$171.219 b	+$45.662 b	+$12.011 b	+195,600
Utilities	+$30.231 b	+$6.639 b	+$2.897 b	+10,692
Construction	+$3.395 b	+$1.720 b	+$1.416 b	+17,673
Manufacturing	+$249.463 b	+$58.695 b	+$31.219 b	+310,610
Wholesale Trade	+$14.963 b	+$10.119 b	+$5.835 b	+55,330
Retail Trade	+$45.285 b	+$33.725 b	+$19.561 b	+506,846
Transportation and Warehousing	+$19.909 b	+$9.905 b	+$6.551 b	+78,416
Information	+$7.089 b	+$4.380 b	+$1.870 b	+14,004
Financial Activities	+$61.195 b	+$18.734 b	+$6.289 b	+53,510
Business Services	+$15.222 b	+$9.006 b	+$7.347 b	+74,655
Health Services	+$10.226 b	+$7.154 b	+$6.049 b	+83,473
Other Services	+$20.299 b	+$10.307 b	+$8.299 b	+166,923
Total	**+$654.606 b**	**+$217.880 b**	**+$110.535 b**	**+1,583,346**

Source: US Multi-Regional Impact Assessment System, The Perryman Group
Notes: Monetary values given in billions of 2020 US dollars per year. Components may not sum due to rounding. Retail Trade includes Restaurants, Financial Activities includes Real Estate.

The Annual Impact of Permian Basin Oil and Gas Activity On Business Activity in the United States - Composite: High Scenario

30% Probability; above $70 per Barrel on Average

Industry	Total Expenditures	Gross Product	Personal Income	Jobs
Agriculture	+$9.735 b	+$2.923 b	+$1.898 b	+24,874
Mining	+$272.742 b	+$72.737 b	+$19.134 b	+311,580
Utilities	+$48.156 b	+$10.576 b	+$4.615 b	+17,033
Construction	+$5.407 b	+$2.741 b	+$2.256 b	+28,151
Manufacturing	+$397.381 b	+$93.497 b	+$49.730 b	+494,784
Wholesale Trade	+$23.836 b	+$16.119 b	+$9.294 b	+88,138
Retail Trade	+$72.136 b	+$53.722 b	+$31.160 b	+807,378
Transportation and Warehousing	+$31.713 b	+$15.777 b	+$10.435 b	+124,912
Information	+$11.292 b	+$6.976 b	+$2.978 b	+22,307
Financial Activities	+$97.481 b	+$29.842 b	+$10.018 b	+85,238
Business Services	+$24.248 b	+$14.346 b	+$11.703 b	+118,921
Health Services	+$16.290 b	+$11.396 b	+$9.635 b	+132,967
Other Services	+$32.335 b	+$16.418 b	+$13.220 b	+265,899
Total	**+$1042.751 b**	**+$347.070 b**	**+$176.076 b**	**+2,522,183**

Source: US Multi-Regional Impact Assessment System, The Perryman Group
Notes: Monetary values given in billions of 2020 US dollars per year. Components may not sum due to rounding. Retail Trade includes Restaurants, Financial Activities includes Real Estate.

The Annual Impact of Permian Basin Oil and Gas Activity On Business Activity in the United States - Composite: Very Low Scenario

5% Probability; $25-$35 per Barrel Range on Average

Industry	Total Expenditures	Gross Product	Personal Income	Jobs
Agriculture	+$3.333 b	+$1.001 b	+$0.650 b	+8,517
Mining	+$93.383 b	+$24.904 b	+$6.551 b	+106,680
Utilities	+$16.488 b	+$3.621 b	+$1.580 b	+5,832
Construction	+$1.851 b	+$0.938 b	+$0.772 b	+9,639
Manufacturing	+$136.057 b	+$32.012 b	+$17.027 b	+169,406
Wholesale Trade	+$8.161 b	+$5.519 b	+$3.182 b	+30,177
Retail Trade	+$24.698 b	+$18.394 b	+$10.669 b	+276,434
Transportation and Warehousing	+$10.858 b	+$5.402 b	+$3.573 b	+42,768
Information	+$3.866 b	+$2.389 b	+$1.020 b	+7,638
Financial Activities	+$33.376 b	+$10.217 b	+$3.430 b	+29,184
Business Services	+$8.302 b	+$4.912 b	+$4.007 b	+40,717
Health Services	+$5.577 b	+$3.902 b	+$3.299 b	+45,526
Other Services	+$11.071 b	+$5.621 b	+$4.526 b	+91,040
Total	**+$357.022 b**	**+$118.832 b**	**+$60.286 b**	**+863,556**

Source: US Multi-Regional Impact Assessment System, The Perryman Group
Notes: Monetary values given in billions of 2020 US dollars per year. Components may not sum due to rounding. Retail Trade includes Restaurants, Financial Activities includes Real Estate.

Additional Forecast Detail

Projected Change in Texas Nominal Gross Product by Industry				
Industry	**2020**		**2021**	
Agriculture	-$422.5 m	-4.45%	+$670.9 m	+7.39%
Mining	-$49,845.7 m	-28.87%	+$46,675.8 m	+38.01%
Utilities	-$1,730.3 m	-5.74%	+$2,572.1 m	+9.05%
Construction	-$1,055.2 m	-1.03%	+$8,408.5 m	+8.26%
Manufacturing	-$20,184.4 m	-8.12%	+$31,165.7 m	+13.64%
Wholesale Trade	-$3,795.9 m	-2.39%	+$14,985.1 m	+9.65%
Retail Trade	-$8,338.0 m	-8.11%	+$11,805.9 m	+12.50%
Transportation and Warehousing	-$3,658.3 m	-5.26%	+$6,847.0 m	+10.39%
Information	-$4,403.0 m	-6.55%	+$6,710.8 m	+10.69%
Finance and Insurance	+$509.9 m	+0.48%	+$6,976.0 m	+6.58%
Real Estate and Rental/Leasing	+$3,687.8 m	+1.96%	+$13,827.2 m	+7.21%
Professional, Scientific, Technical Services	+$3,999.7 m	+2.95%	+$11,831.9 m	+8.49%
Management of Companies	+$56.1 m	+0.21%	+$2,339.1 m	+8.74%
Administrative, Support, Waste Management	+$1,546.2 m	+2.42%	+$4,940.7 m	+7.55%
Educational Services	-$99.2 m	-0.72%	+$1,348.4 m	+9.84%
Health Care and Social Assistance	+$9,540.9 m	+8.14%	+$7,716.6 m	+6.09%
Arts, Entertainment, and Recreation	-$2,740.0 m	-20.64%	+$2,685.5 m	+25.49%
Accommodation and Food Services	-$9,603.2 m	-17.43%	+$10,301.7 m	+22.64%
Other Services	-$1,281.8 m	-3.31%	+$4,466.4 m	+11.93%
Government and Government Enterprises	+$9,218.4 m	+4.77%	+$7,989.8 m	+3.95%
Total	**-$78,598.5 m**	**-4.11%**	**+$204,265.2 m**	**+11.13%**
Source: US Multi-Regional Econometric Model, The Perryman Group				

Projected Change in Permian Basin Nominal Gross Product by Industry				
Industry	**2020**		**2021**	
Agriculture	-$10.0 m	-4.37%	+$16.0 m	+7.29%
Mining	-$9,494.0 m	-33.93%	+$8,254.6 m	+44.66%
Utilities	-$35.6 m	-5.79%	+$52.6 m	+9.08%
Construction	-$21.6 m	-0.99%	+$181.1 m	+8.41%
Manufacturing	-$158.2 m	-6.76%	+$287.1 m	+13.16%
Wholesale Trade	-$99.2 m	-2.37%	+$401.8 m	+9.83%
Retail Trade	-$148.6 m	-8.10%	+$213.2 m	+12.64%
Transportation and Warehousing	-$57.7 m	-5.27%	+$109.8 m	+10.59%
Information	-$37.8 m	-6.42%	+$60.1 m	+10.90%
Finance and Insurance	+$7.8 m	+0.82%	+$62.7 m	+6.52%
Real Estate and Rental/Leasing	+$50.1 m	+1.94%	+$191.5 m	+7.29%
Professional, Scientific, Technical Services	+$32.5 m	+2.98%	+$97.0 m	+8.65%
Management of Companies	+$11.8 m	+2.65%	+$34.1 m	+7.45%
Administrative, Support, Waste Management	+$11.0 m	+1.69%	+$54.0 m	+8.19%
Educational Services	-$7.3 m	-11.14%	+$9.6 m	+16.57%
Health Care and Social Assistance	+$86.2 m	+8.09%	+$69.8 m	+6.06%
Arts, Entertainment, and Recreation	-$49.3 m	-32.64%	+$39.2 m	+38.49%
Accommodation and Food Services	-$164.7 m	-17.14%	+$179.4 m	+22.53%
Other Services	-$26.1 m	-3.41%	+$88.5 m	+11.99%
Government and Government Enterprises	+$121.3 m	+4.62%	+$107.2 m	+3.90%
Total	**-$9,989.4 m**	**-19.07%**	**+$10,509.1 m**	**+24.79%**
Source: US Multi-Regional Econometric Model, The Perryman Group				

Projected Change in Odessa Nominal Gross Product by Industry				
Industry	**2020**		**2021**	
Agriculture	+$0.2 m	-4.14%	-$0.4 m	+7.46%
Mining	-$1,137.7 m	-33.01%	+$1,001.6 m	+43.39%
Utilities	-$7.1 m	-5.75%	+$10.6 m	+9.11%
Construction	-$9.5 m	-1.05%	+$74.9 m	+8.37%
Manufacturing	-$53.0 m	-6.12%	+$102.9 m	+12.66%
Wholesale Trade	-$37.1 m	-2.41%	+$147.7 m	+9.81%
Retail Trade	-$53.4 m	-8.14%	+$75.9 m	+12.61%
Transportation and Warehousing	-$20.3 m	-5.18%	+$39.6 m	+10.64%
Information	-$8.1 m	-5.60%	+$14.7 m	+10.78%
Finance and Insurance	+$1.0 m	+0.58%	+$11.6 m	+6.57%
Real Estate and Rental/Leasing	+$19.2 m	+1.97%	+$72.4 m	+7.31%
Professional, Scientific, Technical Services	+$7.3 m	+2.56%	+$26.0 m	+8.95%
Management of Companies	+$0.1 m	+0.24%	+$3.6 m	+8.83%
Administrative, Support, Waste Management	+$6.2 m	+2.81%	+$18.2 m	+8.03%
Educational Services	-$3.4 m	-24.78%	+$2.9 m	+28.13%
Health Care and Social Assistance	+$28.5 m	+8.07%	+$23.0 m	+6.04%
Arts, Entertainment, and Recreation	-$14.2 m	-39.91%	+$10.5 m	+49.10%
Accommodation and Food Services	-$59.4 m	-17.48%	+$64.0 m	+22.82%
Other Services	-$8.1 m	-2.75%	+$33.3 m	+11.57%
Government and Government Enterprises	+$35.1 m	+4.68%	+$31.0 m	+3.96%
Total	**-$1,313.9 m**	**-11.38%**	**+$1,764.0 m**	**+17.24%**
Source: The US Multi-Regional Econometric Model, The Perryman Group				