



The Perryman Report & Texas Letter

IN THIS ISSUE

COVID-19 COSTS AND OIL PRICES

Measures taken to prevent a major spike in COVID-19 infections have been essential to protecting human health. The inevitable result has been harm to the economy. In this issue, The Perryman Group's estimates of the costs to the US, Texas, and largest Texas metropolitan areas are presented, as well as a perspective on the economy's path forward. In addition, an overview of the current oil price situation is presented.

TEXAS RESPONDS TO THE COVID-19 CRISIS

Texans are putting their best foot forward in response to COVID-19. Check out the unique ways businesses and universities across the state are standing strong and contributing during challenging times.

FOCUS ON: POPULATION

A breakdown of population by MSA provides a quick look at the forecast for 2019 to 2045. See page 7 to get a snapshot of the anticipated growth for the state as well as for an MSA near you.

From all of us here at The Perryman Group, we hope you are safe and well. We are following the COVID-19 situation carefully and, as we have done for almost four decades, take your need for information very seriously. We are analyzing the economic effects on an ongoing basis and will post everything that we generate on our website as a public service at www.perrymangroup.com.

The High Economic Cost of the COVID-19 Pandemic

The disruptions caused by the coronavirus are wreaking havoc on individuals, families, the private sector, the public sector, the health care system, and the economy and society as a whole. In order to “flatten the curve” and prevent a major spike in infections, drastic measures have been taken. The inevitable result has been and likely will continue to be a strong shock to the economy.

Many factors will determine the ultimate effects of the coronavirus on the economy, most of which are highly uncertain at present. The length and severity of the outbreak, the nature and magnitude of the full policy response, and the capacity of businesses to resume normal activities are among myriad phenomena that will play a significant role.

ESTIMATING THE ECONOMIC COST OF COVID-19

The Perryman Group developed a plausible scenario for the ultimate effects of COVID-19 based on a variety of public and private source materials includ-

ing, 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. Reasonable measures of potential direct effects by detailed industrial category were developed through this process. These direct effects were then used as inputs to The Perryman Group's dynamic and integrated econometric and impact assessment systems to determine total economic costs of COVID-19 as various sectors interact throughout the economy. The simulation accounts for the effects of the stimulus package and the recent actions by the Federal Reserve to stabilize financial markets.

US AND TEXAS COSTS

The Perryman Group estimates that the COVID-19 pandemic could cost the US economy approximately \$972.6 billion in real gross product and 11.4 million jobs. Note that job losses are

reported on an annualized basis; thus, many more individuals are likely to be affected for a portion of the year. For Texas, The Perryman Group estimates that the cost of COVID-19 and the associated disruptions in the oil market is almost \$101 billion in real gross product and 1.0 million annualized jobs.

More detailed results by industry for the US and Texas are provided on page 3.

TEXAS METROPOLITAN AREA COSTS

Communities across the state and nation are feeling negative effects, and The Perryman Group estimated the potential costs of COVID-19 for Texas' most populous metropolitan areas.

Projected annualized job losses in Austin-Round Rock-Georgetown total almost 77,400, with over 282,500 in Dallas-Fort Worth-Arlington, nearly 256,000 in Houston-The Woodlands-Sugar Land, and about 81,300 in San Antonio-New Braunfels. Losses are spread across all industrial sectors, particularly the large and high-contact segments such as retail and some types of services. Additional detail, including additional results by industry and some findings for other large states, is available at www.perrymangroup.com.

KEEPING THE NUMBERS IN PERSPECTIVE

Recent estimates of massive job losses associated with COVID-19 are drawing frequent comparisons to the Great Depression. A number making headlines is that unemployment could jump to 32% in the second quarter, an estimate derived by researchers at the St. Louis Federal Reserve Bank. Using detailed occupational data, they analyzed whether various jobs were essential, could be completed remotely, and were salaried to estimate the "high-risk occupations" which met none of these criteria. They also quantified jobs that are high contact. The average of these approaches suggested that about 47 million people could be laid off during the second quarter, yielding 32% unemployment.

This number aligns closely with The Perryman Group's estimates, which were derived through detailed analysis by industry and simulations of resulting economic interactions using the firm's large-scale models. The loss of 11.4 million jobs on an annualized basis can alternatively be viewed as 45.6 million if concentrated in a single quarter.

The talk of massive layoffs and 30% unemployment has led to ubiquitous compari-

sons to the Great Depression. However, prior to the Great Depression, there were massive structural problems in the economy, and policy responses were less well understood. The major harm of the Great Depression was not that joblessness spiked above 30%; it was, rather, that it remained there for almost a decade.

The current situation emanates from a horrific pandemic, but the economic structure is basically sound. The numbers will likely be terrible, but temporary. Once the worst of the virus subsides and social distancing is relaxed, venues will reopen and tens of millions of jobs will quickly be restored. The stimulus package (and perhaps others) and aggressive monetary policy should maintain the fundamentals needed for a rapid recovery.

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 peak job losses and drawing inaccurate parallels to the Great Depression can, in and of itself, be harmful.

To the extent a similar historical period exists (and there are myriad differences), it is the Spanish flu outbreak of 1918-19. The population was one-third of current levels, and 600,000 US lives were lost. We must remember, however, that the period immediately thereafter is known as the “Roaring 20s.” If the economic structure remains intact, we can expeditiously rebound from a health-induced crisis.

LOOKING AHEAD TOWARD RECOVERY

It is impossible to predict how the pandemic will play out and what will ultimately happen, but the similarity and enormity of job loss estimates by The Perryman Group and other researchers suggest that the job market and the economy will endure a powerful jolt.

Given the number of aspects of the economy that are being affected (and, for Texas, the oil situation) a period of significant contraction for the economy is inevitable. However, because the underlying economy was strong prior to this situation, it is likely to be more of a pause than a fundamental change, with a fairly rapid recovery once the worst of the virus is past. A key aspect of performance

(continued on page 6)

A Representative Illustration of the Potential Overall Impact of the COVID-19 Pandemic on Business Activity in the United States

Results by industry sector in billions of 2012 US dollars

Industry Sector	Real Total Expenditures	Real Gross Product	Real Personal Income	Jobs
Agriculture	-\$55.565 b	-\$14.526 b	-\$9.419 b	-148,735
Mining	-\$121.201 b	-\$31.807 b	-\$18.000 b	-145,119
Utilities	-\$88.517 b	-\$20.330 b	-\$8.872 b	-37,571
Construction	-\$81.454 b	-\$39.952 b	-\$32.923 b	-464,268
Manufacturing	-\$707.318 b	-\$216.937 b	-\$122.580 b	-1,801,934
Wholesale Trade	-\$125.973 b	-\$85.247 b	-\$49.154 b	-549,631
Retail Trade*	-\$348.381 b	-\$241.617 b	-\$137.000 b	-4,737,870
Logistics*	-\$105.709 b	-\$65.773 b	-\$43.500 b	-601,228
Information	-\$27.575 b	-\$16.686 b	-\$7.124 b	-62,987
Financial Activities*	-\$213.904 b	-\$70.131 b	-\$28.709 b	-288,794
Business Services	-\$77.621 b	-\$46.207 b	-\$37.693 b	-458,609
Health Services	+\$25.858 b	+\$16.066 b	+\$13.584 b	+224,354
Other Services	-\$282.524 b	-\$139.430 b	-\$100.469 b	-2,366,242
All Industries	-\$2,209.884 b	-\$972.578 b	-\$581.858 b	-11,438,635

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values given in billions of 2012 US dollars. Components may not sum due to rounding. Retail Trade includes Restaurants, Logistics includes Transportation & Warehousing, Financial Activities includes Real Estate.

A Representative Illustration of the Potential Overall Impact of the COVID-19 Pandemic on Business Activity in the State of Texas

Results by industry sector in billions of 2012 US dollars

Industry Sector	Real Total Expenditures	Real Gross Product	Real Personal Income	Jobs
Agriculture	-\$3.314 b	-\$0.858 b	-\$0.560 b	-8,848
Mining	-\$85.183 b	-\$21.450 b	-\$11.607 b	-91,489
Utilities	-\$8.281 b	-\$1.902 b	-\$0.830 b	-3,515
Construction	-\$8.699 b	-\$4.267 b	-\$3.516 b	-49,579
Manufacturing	-\$54.557 b	-\$16.118 b	-\$9.063 b	-124,835
Wholesale Trade	-\$12.443 b	-\$8.420 b	-\$4.855 b	-54,289
Retail Trade*	-\$31.013 b	-\$21.311 b	-\$12.046 b	-422,656
Logistics*	-\$10.394 b	-\$6.468 b	-\$4.277 b	-59,119
Information	-\$2.335 b	-\$1.413 b	-\$0.603 b	-5,334
Financial Activities*	-\$21.159 b	-\$6.725 b	-\$2.669 b	-26,702
Business Services	-\$6.644 b	-\$3.955 b	-\$3.226 b	-39,253
Health Services	+\$2.075 b	+\$1.289 b	+\$1.090 b	+18,005
Other Services	-\$18.809 b	-\$9.392 b	-\$6.824 b	-160,353
All Industries	-\$260.755 b	-\$100.989 b	-\$58.987 b	-1,027,969

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Monetary values given in billions of 2012 US dollars. Components may not sum due to rounding. Retail Trade includes Restaurants, Logistics includes Transportation & Warehousing, Financial Activities includes Real Estate.

Oil Prices and the Energy Sector

Earlier this year, oil prices began to fall 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 in March plummeted as the effects of the virus spread across the world, falling by more than 20%. 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 is essentially a price war with Russia (after that country refused to endorse 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) can sustain these prices indefinitely, but it remains to be seen when the situation will be resolved. Until then, the US

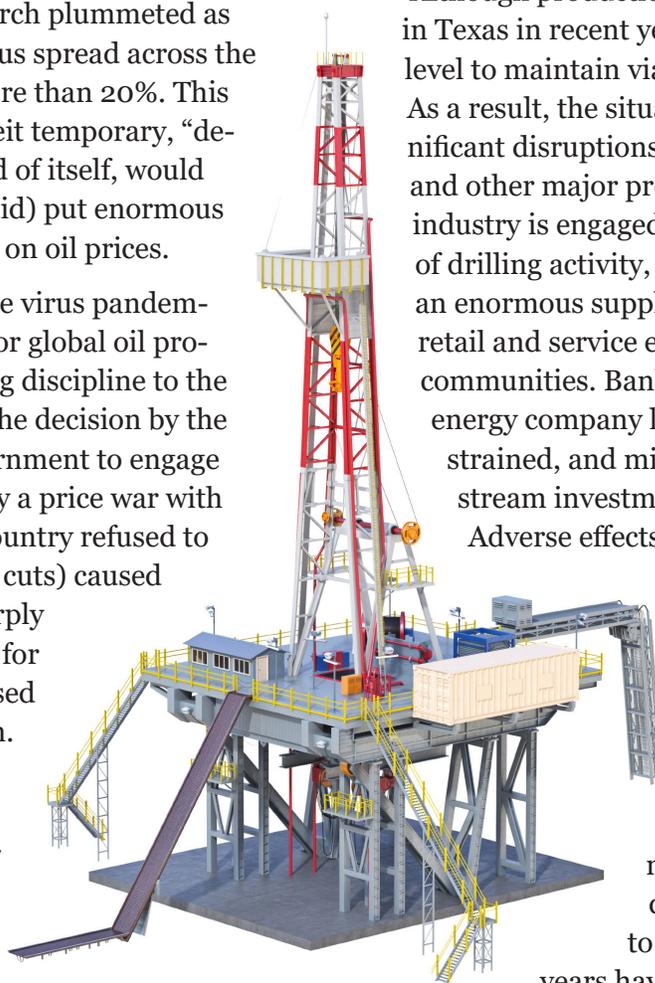
industry will struggle, particularly smaller and mid-sized firms, as credit dries up and profits vanish.

Although production costs are down sharply in Texas in recent years, they are not yet at a level to maintain viability at current prices. As a result, the situation is leading to significant disruptions in the Permian Basin and other major production areas. 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 down-stream investments are being deferred.

Adverse effects on oil producing areas are already 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 in recent

years have been paused but remain in place. The emerging segments of the world economy will continue to expand rapidly once the virus subsides and will require enormous energy supplies. As demand recovers and supply issues are resolved over time, oil prices will begin to rise.



TEXAS RESPONDS TO THE COVID-19 CRISIS

SAN ANTONIO

City-based H-E-B has stepped up its game in response to the coronavirus crisis. The grocery giant has delivered truckloads of products to food banks across the state and is making a \$3 million commitment to support local organizations in the fight.

Frost Bank, the largest regional bank headquartered in San Antonio, has also donated \$2 million to relief efforts and will designate half of that for area groups.

FORT WORTH

Insurance and financial services firm Higginbotham is making a weekly commitment to support community service workers during the COVID-19 outbreak. Not only are they having meals delivered to those on the front line, they are also supporting local restaurants by purchasing food through their “Higginbotham Helps” program.

HOUSTON

A team from Rice University has partnered with Canadian company Metric Technologies to develop a low-cost ventilator prototype. Geared toward noncritical coronavirus patients, plans for the device will be freely available online.

EL PASO

The city has entered into an interlocal agreement with the University of Texas at El Paso to increase its COVID-19 testing capacity. Faculty and staff from the College of Health Science’s Clinical Laboratory Science program are working with public health technicians to analyze results from the city’s drive-thru test site.

IRVING

7-Eleven, Inc.’s headquarters announced that it has donated 1 million masks to the Federal Emergency Management Agency (FEMA). The convenience retailer is also providing personal protective equipment for all its store employees.

Craft retailer Michael’s which is headquartered in the Las Colinas development, is donating 10,000 bolts of fabric to support Dallas-area groups that are coordinating mask-sewing projects for health care workers.

DALLAS

UT Southwestern Medical Center will be one of the first hospitals to receive face shields produced by Toyota Motor North America. Headquartered in Plano, the automaker will also distribute protective equipment made at its idled plants to MD Anderson in Houston and facilities in Kentucky and Indiana.

AUSTIN

Researchers at the University of Texas are working with Dell Medical School on a 3D-printed mask design for hospitals. Texas Inventionworks, the Cockrell School’s innovation hub, is finalizing details so that mass production can begin soon.

Tito’s Handmade Vodka has started production of a hand cleaning solution to give to those in need in the community. The distillery hopes to make 24 tons of hand sanitizer that adheres to industry and governmental guidance.

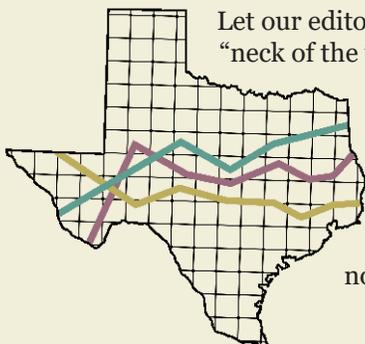
MIDLAND

Imperative Chemical Partners, a specialty chemical provider to operators and midstream companies, made and donated \$75,000 worth of hand sanitizer to the Medical Center Health System. Thanks to their quick response to a potential shortage, the hospital now has an adequate supply.

WACO

GelPro, a maker of comfort floor mats, is shifting gears at its 70,000 square foot manufacturing facility here. The company has started producing medical face shields and shipped its first batch to New York City.

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The Perryman Report & Texas Letter is read monthly by the state’s most notable leaders.



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is consumer spending, since in normal times such spending drives about 70% of the economy. Uncertainty and job losses are reducing spending for discretionary items ranging from travel to automobiles to clothing and household goods.

Spending will likely increase fairly quickly once the situation improves, with the ultimate economic effects notable for a quarter or two, but not dramatic in terms of long-term performance. Unlike the Great Depression as described previously or even the dot-com debacle, the savings and loan mess in the 1980s, or the more recent Great Recession, there is not an overarching major problem (such as an overheated market ripe for a crash). A combination of unique and unprecedented issues is causing slowing, but

as they are dealt with, growth will pick up.

In fact, while The Perryman Group expects economic patterns for the next couple of years to be very different from the firm's projections prior to the outbreak, there is not yet evidence that the five-year and long-term outlooks should be modified at this time.

CONCLUSION

Unlike many economic issues, much of the solution to this situation must come from the health care and biosciences sectors. The physical wellbeing of the population is of paramount concern, yet the economic consequences must also be addressed as they exert a notable human cost as well.

Aggressive monetary and fiscal policy measures can help reduce downstream

losses and dampen the ultimate economic costs of COVID-19. Although the situation is changing rapidly and the ultimate outcomes will undoubtedly vary from the losses estimated by The Perryman Group, they provide a guideline for planning and expectations.

There is a sharp drop in economic activity at present, but there is no reason to believe the US will enter an extended depression. The basic structure of the economy was sound prior to the outbreak, and the current downturn is essentially fallout from a health crisis (which should be our primary focus). Assuming that through aggressive monetary policy, targeted fiscal stimulus, and other measures the basic economic structure can be kept in place, the recovery should be relatively rapid once the virus risk has abated.

A Representative Illustration of the Potential Overall Impact of the COVID-19 Pandemic on Jobs in Texas Metropolitan Areas

Industry Sector	Austin-Round Rock-Georgetown	Dallas-Fort Worth-Arlington	Houston-The Woodlands-Sugar Land	San Antonio-New Braunfels	Remaining Regions
Agriculture	-182	-545	-468	-293	-7,361
Mining	-969	-8,224	-32,542	-2,543	-47,211
Utilities	-153	-590	-1,119	-74	-1,580
Construction	-3,907	-12,731	-14,258	-3,486	-15,198
Manufacturing	-7,099	-37,186	-27,290	-7,682	-45,578
Wholesale Trade	-4,789	-18,599	-15,653	-3,410	-11,839
Retail Trade*	-36,506	-115,428	-98,854	-38,252	-133,616
Logistics*	-2,166	-22,025	-14,669	-3,563	-16,697
Information	-673	-2,270	-791	-639	-961
Financial Activities*	-2,106	-10,365	-5,223	-3,386	-5,621
Business Services	-4,015	-13,452	-10,949	-3,095	-7,743
Health Services	+1,164	+4,737	+3,927	+1,648	+6,529
Other Services	-15,969	-45,844	-38,066	-16,506	-43,969
All Industries	-77,370	-282,520	-255,953	-81,281	-330,845

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Notes: Components may not sum due to rounding. Retail Trade includes Restaurants, Logistics includes Transportation & Warehousing, Financial Activities includes Real Estate.

FOCUS ON: POPULATION

Major Metropolitan Areas	2019	2045	Gain	Growth
Austin-Round Rock-Georgetown MSA	2,192,031	3,434,251	+1,242,220	+1.74%
Dallas-Plano-Irving MD*	5,076,850	7,730,180	+2,653,330	+1.63%
Fort Worth-Arlington-Grapevine MD*	2,498,624	3,716,386	+1,217,763	+1.54%
El Paso MSA	864,618	1,155,679	+291,061	+1.12%
Houston-The Woodlands-Sugar Land MSA	7,086,159	10,049,266	+2,963,107	+1.35%
McAllen-Edinburg-Mission MSA	881,253	1,185,253	+304,000	+1.15%
San Antonio-New Braunfels MSA	2,553,694	3,814,584	+1,260,890	+1.56%
STATE OF TEXAS	29,090,626	41,220,888	+12,130,262	+1.35%

Other Metropolitan Areas	2019	2045	Gain	Growth
Abilene MSA	173,922	227,553	+53,631	+1.04%
Amarillo MSA	269,540	333,690	+64,151	+0.82%
Beaumont-Port Arthur MSA	404,749	490,299	+85,550	+0.74%
Brownsville-Harlingen MSA	433,814	582,603	+148,790	+1.14%
College Station-Bryan MSA	265,182	373,964	+108,781	+1.33%
Corpus Christi MSA	436,744	554,473	+117,729	+0.92%
Killeen-Temple MSA	455,565	633,621	+178,057	+1.28%
Laredo MSA	281,925	389,047	+107,122	+1.25%
Longview MSA	288,664	350,548	+61,884	+0.75%
Lubbock MSA	323,986	425,713	+101,728	+1.06%
Midland MSA	176,657	273,420	+96,764	+1.69%
Odessa MSA	161,941	237,892	+75,951	+1.49%
San Angelo MSA	122,047	137,507	+15,460	+0.46%
Sherman-Denison MSA	135,748	210,347	+74,599	+1.70%
Texarkana MSA	95,077	108,866	+13,789	+0.52%
Tyler MSA	232,725	305,229	+72,504	+1.05%
Victoria MSA	101,194	122,298	+21,104	+0.73%
Waco MSA	274,153	352,142	+77,990	+0.97%
Wichita Falls MSA	152,700	171,272	+18,572	+0.44%

* Metropolitan Division (part of the Dallas-Fort Worth-Arlington MSA)

Notes: "Gain" refers to the absolute change in value from 2019 to 2045 while "Growth" refers to the compound annual growth rate over 2019-2045.



The Perryman Group is a focused team of analysts who know how to address complex economic information tasks and present our findings effectively.

Our in-house professionals bring expertise in **economics, finance, statistics, mathematics, real estate, valuation, systems analysis, engineering, technical communications, and marketing.** Dr. Ray Perryman, President and CEO, has 40 years of experience in developing systems, analyzing complex problems, and communicating effectively. We have considerable pride in what we do. Our enthusiasm is both unbridled and contagious; every day brings a new opportunity for us to tackle a different problem or create a product or service specifically tailored to our clients.

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Dr. Perryman addresses dozens of audiences throughout the world every year, catering to a wide variety of events.

M. RAY PERRYMAN, PH.D.

Dr. Ray Perryman is President and CEO of The Perryman Group, an economic research and analysis firm based in Waco, Texas. His firm has served the needs of more than 2,500 clients, including two-thirds of the Global 25, over half of the Fortune 100, the 12 largest technology firms in the world, 10 US Cabinet Departments, the 9 largest firms in the US, the 6 largest energy companies operating in the US, and the 5 largest US banking institutions.

Dr. Perryman was named Outstanding Young Person of the World for Business and Economic Innovation in 1987, was designated Texan of the Year by the Texas Legislative Conference in 2012, received the Baylor University Distinguished Service Medal in 2013, was inducted into the Texas Leadership Hall of Fame in 2014, and received the Cesar E. Chavez Conscience Builders Award in 2016 for his humanitarian efforts. He recently received the 2019



Chairman's Award for Lifetime Achievement in Economic Development from the International Economic Development Council and the 2019 "Go Global" Award from the International Trade Council as the outstanding global economic analyst for his work on trade, energy, the environment and other international issues. He dedicates a significant portion of his time to *pro bono* work aimed at helping to solve pressing social problems such as hunger, indigent healthcare, poverty, and child maltreatment.

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