The Perryman Group
The Economic Outlook for Texas' Major Metro Areas: Projected Recession and Recovery from COVID-19 April 2020

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.

Massive layoffs and talk of double-digit unemployment have led to ubiquitous comparisons to the Great Depression. 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.

TEXAS ECONOMIC OUTLOOK

For Texas, the negative effects of COVID-19 have been compounded by turmoil in energy markets, with a price war between Saudi Arabia and Russia causing an increase in supply even as demand dwindled with COVID-19 disruptions. Although recent agreements have reduced

Major Metropolitan Area Outlook through 2021
Wage & salary employment by metropolitan area

Region	Loss in 2020		Recovery in 2021	
	Absolute	Percent	Absolute	Percent
Austin-Round Rock-Georgetown MSA	-64,894	-5.83%	+56,027	+5.35%
Dallas-Plano-Irving MD	-163,477	-5.87%	+144,456	+5.51%
El Paso MSA	-19,250	-5.37%	+15,920	+4.69%
Fort Worth-Arlington-Grapevine MD	-76,418	-7.03%	+59,084	+5.85%
Houston-The Woodlands-Sugar Land MSA	-226,418	-6.96%	+177,229	+5.85%
McAllen-Edinburg-Mission MSA	-12,976	-4.54%	+12,187	+4.47%
San Antonio-New Braunfels MSA	-69,600	-6.11%	+57,023	+5.33%
State of Texas	**-860,967**	**-6.48%**	**+684,793**	**+5.51%**

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

Notes: "MSA" refers to Metropolitan Statistical Areas and "MD" refers to Metropolitan Divisions.

global oil production, the market remains oversupplied and prices have fallen dramatically.

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%). 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). For additional detail, see The Perryman Group's recent release at www.perrymangroup.com.

OUTLOOK FOR MAJOR METROPOLITAN AREAS

The Perryman Group also analyzed the effects for Texas' largest metropolitan areas. The economic fallout will be significant for each, with the degree of decline and speed of recovery influenced by the differing concentrations of industries across population centers. Higher concentrations within the energy sector, for example, will contribute to larger jobs and output losses this year and a somewhat different recovery pattern.

For the Austin-Round Rock-Georgetown MSA, job losses for 2020 are expected to be almost 64,900 (a 5.83% decline), with the addition of over 56,000 positions in 2021 (up 5.35%). The Dallas-Plano-Irving MD is projected to lose nearly 163,500 jobs this year (-5.87%), with a 2021 increase of 144,456 (+5.51%). In the El Paso MSA, 2020 losses are forecast to be 19,250 (-5.37%), with a 2021 recovery of 15,920 jobs next year (+4.69%). Fort Worth-Arlington-Grapevine MD employment is likely to fall

by over 76,400 this year (-7.03%) but be up by almost 59,100 (+5.85%) for 2021.

In the Houston-The Woodlands-Sugar Land MSA, some 226,400 jobs are likely to be lost in 2020 (-6.96%), with over 177,200 regained in 2021 (5.85% growth). The McAllen-Edinburg-Mission MSA is forecast to experience a reduction in employment of almost 13,000 (-4.54%) this year, recovering about 12,200 next year (+4.47%). For the San Antonio-New Braunfels MSA, losses will likely total 69,600 for 2020 (-6.11%), while gains in 2021 exceed 57,000 (+5.33%). More detail, including projections by industry, is provided in the accompanying tables.

CONCLUSION

Although several years will be required for recovery, The Perryman Group's long-term outlook remains positive for Texas and its major urban centers. As noted, the economy was sound going into the COVID-19 pandemic and should be able to emerge and recover in a reasonable period of time.

Texas Wage & Salary Employment Change from Pre-Virus Projections
Results by metropolitan area

Region	Change
Austin-Round Rock-Georgetown MSA	-88,072
Dallas-Plano-Irving MD	-225,028
El Paso MSA	-25,460
Fort Worth-Arlington-Grapevine MD	-100,658
Houston-The Woodlands-Sugar Land MSA	-289,624
McAllen-Edinburg-Mission MSA	-18,611
San Antonio-New Braunfels MSA	-91,482
State of Texas	**-1,111,724**

Source: US Multi-Regional Econometric Model, The Perryman Group
Notes: "MSA" refers to Metropolitan Statistical Areas, "MD" refers to Metropolitan Divisions

Austin-Round Rock-Georgetown MSA Outlook through 2021
Wage & salary employment by industry sector

Industry Sector	Loss/Gain in 2020		Recovery in 2021	
	Absolute	Percent	Absolute	Percent
Agriculture	-127	-7.10%	+72	+4.28%
Mining	-1,058	-24.39%	+619	+18.88%
Utilities	-201	-8.60%	+124	+5.82%
Construction	-3,053	-4.81%	+2,512	+4.16%
Manufacturing	-5,134	-8.30%	+3,151	+5.55%
Wholesale Trade	-3,510	-6.10%	+3,024	+5.59%
Retail Trade	-12,609	-11.57%	+8,210	+8.52%
Transportation and Warehousing	-1,721	-8.42%	+1,302	+6.96%
Information	-2,854	-8.37%	+1,944	+6.22%
Finance and Insurance	-1,390	-2.92%	+1,407	+3.05%
Real Estate and Rental/Leasing	-446	-2.09%	+621	+2.97%
Professional, Scientific, Technical Services	-393	-0.33%	+3,908	+3.33%
Management of Companies	-865	-11.47%	+622	+9.32%
Administrative, Support, Waste Management	-1,922	-2.66%	+2,860	+4.06%
Educational Services	-798	-4.29%	+1,012	+5.69%
Health Care and Social Assistance	+3,823	+3.63%	+1,704	+1.56%
Arts, Entertainment, and Recreation	-4,210	-27.85%	+2,613	+23.96%
Accommodation and Food Services	-25,687	-21.76%	+16,054	+17.38%
Other Services	-4,480	-7.82%	+3,884	+7.36%
Government and Government Enterprises	+1,743	+0.98%	+385	+0.22%
Total, All Industries	**-64,894**	**-5.83%**	**+56,027**	**+5.35%**

Source: US Multi-Regional Econometric Model, The Perryman Group
Notes: Components may not sum due to rounding.

Dallas-Plano-Irving MD Outlook through 2021
Wage & salary employment by industry sector

Industry Sector	Loss/Gain in 2020		Recovery in 2021	
	Absolute	Percent	Absolute	Percent
Agriculture	-240	-7.50%	+121	+4.10%
Mining	-4,298	-36.98%	+2,347	+32.04%
Utilities	-575	-8.52%	+362	+5.86%
Construction	-7,352	-4.95%	+5,768	+4.09%
Manufacturing	-21,360	-11.57%	+12,420	+7.61%
Wholesale Trade	-10,009	-6.33%	+8,086	+5.46%
Retail Trade	-30,147	-11.45%	+20,020	+8.59%
Transportation and Warehousing	-9,900	-8.46%	+7,424	+6.93%
Information	-6,012	-8.56%	+3,815	+5.94%
Finance and Insurance	-5,680	-2.93%	+5,766	+3.06%
Real Estate and Rental/Leasing	-1,436	-2.31%	+1,711	+2.82%
Professional, Scientific, Technical Services	-3,099	-1.26%	+9,637	+3.97%
Management of Companies	-1,573	-3.06%	+2,081	+4.17%
Administrative, Support, Waste Management	-3,403	-1.41%	+8,745	+3.67%
Educational Services	-1,507	-3.69%	+1,855	+4.71%
Health Care and Social Assistance	+10,129	+3.67%	+4,471	+1.56%
Arts, Entertainment, and Recreation	-7,791	-23.43%	+5,039	+19.79%
Accommodation and Food Services	-53,451	-21.55%	+34,632	+17.80%
Other Services	-9,765	-8.20%	+9,019	+8.25%
Government and Government Enterprises	+3,993	+1.30%	+1,139	+0.36%
Total, All Industries	**-163,477**	**-5.87%**	**+144,456**	**+5.51%**

Source: US Multi-Regional Econometric Model, The Perryman Group
Notes: Components may not sum due to rounding.

El Paso MSA Outlook through 2021
Wage & salary by industry sector

Industry Sector	Loss/Gain in 2020		Recovery in 2021	
	Absolute	Percent	Absolute	Percent
Agriculture	-61	-7.15%	+34	+4.25%
Mining	-5	-9.00%	+4	+7.27%
Utilities	-133	-8.46%	+85	+5.90%
Construction	-913	-5.11%	+678	+3.99%
Manufacturing	-2,652	-16.05%	+1,444	+10.41%
Wholesale Trade	-819	-6.45%	+640	+5.39%
Retail Trade	-4,683	-11.72%	+2,970	+8.42%
Transportation and Warehousing	-1,330	-8.61%	+964	+6.83%
Information	-363	-7.68%	+236	+5.40%
Finance and Insurance	-263	-3.16%	+232	+2.88%
Real Estate and Rental/Leasing	-139	-2.65%	+137	+2.67%
Professional, Scientific, Technical Services	-488	-5.66%	+485	+5.96%
Management of Companies	-161	-10.87%	+130	+9.82%
Administrative, Support, Waste Management	-71	-0.28%	+663	+2.59%
Educational Services	-313	-8.28%	+264	+7.60%
Health Care and Social Assistance	+1,490	+3.32%	+654	+1.41%
Arts, Entertainment, and Recreation	-611	-26.76%	+377	+22.55%
Accommodation and Food Services	-7,621	-21.77%	+4,723	+17.25%
Other Services	-1,098	-7.04%	+980	+6.76%
Government and Government Enterprises	+985	+1.00%	+221	+0.22%
Total, All Industries	**-19,250**	**-5.37%**	**+15,920**	**+4.69%**

Source: US Multi-Regional Econometric Model, The Perryman Group
Notes: Components may not sum due to rounding.

Fort Worth-Arlington-Grapevine MD Outlook through 2021
Wage & salary employment by industry sector

Industry Sector	Loss/Gain in 2020		Recovery in 2021	
	Absolute	Percent	Absolute	Percent
Agriculture	-148	-6.89%	+88	+4.40%
Mining	-4,609	-31.69%	+2,612	+26.30%
Utilities	-189	-8.28%	+126	+6.01%
Construction	-3,272	-5.18%	+2,366	+3.95%
Manufacturing	-14,769	-14.53%	+8,457	+9.73%
Wholesale Trade	-3,478	-6.16%	+2,949	+5.56%
Retail Trade	-13,745	-11.63%	+8,848	+8.47%
Transportation and Warehousing	-4,195	-4.84%	+3,727	+4.51%
Information	-1,630	-14.99%	+899	+9.72%
Finance and Insurance	-1,316	-2.69%	+1,394	+2.92%
Real Estate and Rental/Leasing	-372	-2.26%	+458	+2.84%
Professional, Scientific, Technical Services	-1,199	-2.89%	+1,794	+4.45%
Management of Companies	-447	-5.18%	+440	+5.37%
Administrative, Support, Waste Management	-846	-1.31%	+1,786	+2.81%
Educational Services	-799	-4.80%	+848	+5.35%
Health Care and Social Assistance	+3,898	+3.23%	+1,681	+1.35%
Arts, Entertainment, and Recreation	-3,435	-18.68%	+2,343	+15.67%
Accommodation and Food Services	-23,432	-22.65%	+14,311	+17.88%
Other Services	-4,258	-8.42%	+3,432	+7.41%
Government and Government Enterprises	+1,824	+1.30%	+524	+0.37%
Total, All Industries	**-76,418**	**-7.03%**	**+59,084**	**+5.85%**

Source: US Multi-Regional Econometric Model, The Perryman Group
Notes: Components may not sum due to rounding.

Houston-The Woodlands-Sugar Land MSA Outlook through 2021
Wage & salary employment by industry sector

Industry Sector	Loss/Gain in 2020		Recovery in 2021	
	Absolute	Percent	Absolute	Percent
Agriculture	-327	-7.08%	+190	+4.44%
Mining	-33,646	-38.89%	+18,850	+35.66%
Utilities	-1,473	-8.62%	+905	+5.80%
Construction	-11,978	-5.19%	+8,633	+3.95%
Manufacturing	-28,217	-11.64%	+16,308	+7.61%
Wholesale Trade	-11,489	-6.42%	+9,044	+5.40%
Retail Trade	-36,196	-11.77%	+22,751	+8.38%
Transportation and Warehousing	-11,914	-8.66%	+8,553	+6.81%
Information	-3,719	-12.03%	+2,193	+8.06%
Finance and Insurance	-3,316	-3.01%	+3,095	+2.90%
Real Estate and Rental/Leasing	-1,637	-2.67%	+1,586	+2.66%
Professional, Scientific, Technical Services	-3,695	-1.53%	+8,984	+3.77%
Management of Companies	-1,563	-3.21%	+2,114	+4.48%
Administrative, Support, Waste Management	-4,006	-1.71%	+8,194	+3.55%
Educational Services	-2,068	-3.42%	+2,831	+4.85%
Health Care and Social Assistance	+11,124	+3.27%	+4,823	+1.37%
Arts, Entertainment, and Recreation	-8,443	-22.68%	+5,382	+18.69%
Accommodation and Food Services	-64,856	-21.90%	+40,113	+17.34%
Other Services	-13,542	-8.04%	+11,577	+7.47%
Government and Government Enterprises	+4,545	+1.08%	+1,105	+0.26%
Total, All Industries	**-226,418**	**-6.96%**	**+177,229**	**+5.85%**

Source: US Multi-Regional Econometric Model, The Perryman Group
Notes: Components may not sum due to rounding.

McAllen-Edinburg-Mission MSA Outlook through 2021
Wage & salary employment by industry sector

Industry Sector	Loss/Gain in 2020		Recovery in 2021	
	Absolute	Percent	Absolute	Percent
Agriculture	-408	-7.15%	+225	+4.26%
Mining	-514	-32.04%	+292	+26.77%
Utilities	-73	-8.62%	+45	+5.80%
Construction	-368	-5.19%	+265	+3.95%
Manufacturing	-1,022	-14.51%	+574	+9.53%
Wholesale Trade	-592	-6.31%	+481	+5.47%
Retail Trade	-4,369	-11.75%	+2,754	+8.39%
Transportation and Warehousing	-682	-8.71%	+485	+6.77%
Information	-211	-8.33%	+137	+5.89%
Finance and Insurance	-212	-2.93%	+198	+2.82%
Real Estate and Rental/Leasing	-58	-2.57%	+59	+2.71%
Professional, Scientific, Technical Services	-207	-3.85%	+258	+4.99%
Management of Companies	-86	-12.19%	+60	+9.78%
Administrative, Support, Waste Management	-63	-0.54%	+316	+2.73%
Educational Services	-443	-21.53%	+279	+17.27%
Health Care and Social Assistance	+2,464	+3.33%	+1,089	+1.43%
Arts, Entertainment, and Recreation	-508	-24.91%	+319	+20.86%
Accommodation and Food Services	-5,233	-21.90%	+3,245	+17.39%
Other Services	-1,043	-6.87%	+956	+6.76%
Government and Government Enterprises	+652	+1.05%	+151	+0.24%
Total, All Industries	**-12,976**	**-4.54%**	**+12,187**	**+4.47%**

Source: US Multi-Regional Econometric Model, The Perryman Group
Notes: Components may not sum due to rounding.

San Antonio-New Braunfels MSA Outlook through 2021
Wage & salary employment by industry sector

Industry Sector	Loss/Gain in 2020		Recovery in 2021	
	Absolute	Percent	Absolute	Percent
Agriculture	-206	-7.13%	+117	+4.38%
Mining	-3,174	-30.16%	+1,834	+24.94%
Utilities	-98	-8.68%	+59	+5.76%
Construction	-2,849	-5.11%	+2,115	+4.00%
Manufacturing	-7,368	-14.76%	+4,054	+9.52%
Wholesale Trade	-2,490	-6.39%	+1,976	+5.42%
Retail Trade	-13,521	-11.67%	+8,641	+8.45%
Transportation and Warehousing	-2,628	-8.61%	+1,907	+6.84%
Information	-1,971	-9.33%	+1,232	+6.44%
Finance and Insurance	-2,519	-3.30%	+2,233	+3.03%
Real Estate and Rental/Leasing	-464	-2.50%	+497	+2.75%
Professional, Scientific, Technical Services	-1,335	-2.34%	+2,430	+4.36%
Management of Companies	-461	-3.37%	+584	+4.42%
Administrative, Support, Waste Management	-881	-1.14%	+2,431	+3.17%
Educational Services	-921	-4.55%	+1,041	+5.38%
Health Care and Social Assistance	+4,895	+3.35%	+2,142	+1.42%
Arts, Entertainment, and Recreation	-4,426	-25.22%	+2,779	+21.18%
Accommodation and Food Services	-26,751	-21.39%	+16,751	+17.04%
Other Services	-4,491	-8.44%	+3,733	+7.66%
Government and Government Enterprises	+2,059	+0.99%	+464	+0.22%
Total, All Industries	**-69,600**	**-6.11%**	**+57,023**	**+5.33%**

Source: US Multi-Regional Econometric Model, The Perryman Group
Notes: Components may not sum due to rounding.

State of Texas Outlook through 2021
Wage & salary employment by industry sector

Industry Sector	Loss/Gain in 2020		Recovery in 2021	
	Absolute	Percent	Absolute	Percent
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, All Industries	**-860,967**	**-6.48%**	**+684,793**	**+5.51%**

Source: US Multi-Regional Econometric Model, The Perryman Group
Notes: Components may not sum due to rounding.

METHODS AND ASSUMPTIONS

These projections are based on The Perryman Group's forecasting system, the US Multi-Regional Econometric Model, which provides detailed industry-level projections for the various regions and metropolitan areas within the United States. 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. The model is the result of more than four decades of continuing research in econometrics, economic theory, statistical methods, key policy issues, and behavioral patterns, as well as intensive, ongoing study of all aspects of the economy. It is extensively used by scores of federal and State governmental entities on an ongoing basis, as well

as hundreds of major corporations.

The firm's US Multi-Regional Impact Assessment System was also integrated in this dynamic analysis of COVID-19's effects on the outlook for the US and Texas. The Perryman Group developed a scenario for estimating the effects of COVID-19 which reflects 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. Reasonable measures of potential direct effects by detailed industrial category were developed and

used as inputs to the impact assessment system. The anticipated effects of the virus going forward and recent and expected monetary and fiscal policy actions were incorporated into projections of economic indicators.

These systems have been developed, maintained, and expanded by The Perryman Group over the past four decades. They have been used in thousands of applications, including numerous crisis situations (including several natural disasters), major health care issues (such as cancer and diabetes), pressing social concerns (such as hunger, child maltreatment, homelessness, and indigent health care), and substantial disruptions in global energy markets.

THE PERRYMAN GROUP

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

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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. Perryman is the President and CEO of the Perryman Group and Distinguished Professor of Economic Theory and Method at the International Institute for Advanced Studies. Over the past 40 years, Dr. Perryman has helped recruit corporations providing tens of thousands of jobs through economic development work, resolved billion-dollar legal issues, and revamped public policy through impact assessments and other studies. His firm has measured economic impacts for corporate locations and expansions involving billions in investments, and his economic forecasts are used by corporations and government agencies alike.

He has provided economic analysis and expert testimony for civil litigation across a wide range of practice areas including antitrust and competition, intellectual property disputes, securities, and commercial and complex litigation. His work combines strong expertise in economic damages calculation, asset valuation, market analysis, and statistical methods and econometrics.

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