



The Perryman Group

COVID-19 Pandemic Could Cost Most Populous US States Hundreds of Thousands of Job-Years March 2020

The inevitable result of measures taken to “flatten the curve” and prevent a major spike in coronavirus infections has been a strong shock to the economy. As noted in a recent report by The Perryman Group related to COVID-19’s impact on the US economy, many factors will determine the ultimate effects of the coronavirus on the economy, most of which are highly uncertain at present.

The Perryman Group developed a plausible scenario for estimating the ultimate effects of the coronavirus based on a variety of public and private source materials (further described in the US report available at perrymangroup.com). 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 job-years (a job-year is the equivalent of one person working for a year, though it could be multiple individuals working partial years).

Communities across the nation are feeling negative effects. The Perryman Group estimated the potential costs of COVID-19 for the nation’s 10 most populous states. Projected job losses in California total over 1.4 million job-years, with 1.0 million in Texas, 723,500 in Florida, and 670,700 in New York.

Note that jobs are reported on an annual basis; thus, many more individuals are likely to be affected for a portion of the year. More detailed results by industry are provided on the following pages. Although the situation is changing rapidly and the ultimate outcomes will undoubtedly vary from these estimates, they provide a guideline for planning and expectations.

The physical wellbeing of the population is of paramount concern, yet the economic consequences must also be aggressively addressed as they too involve substantial human costs.

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

State	Real Total Expenditures	Real Gross Product	Real Personal Income	Job-Years
California	-\$266.413 b	-\$117.866 b	-\$71.027 b	-1,416,219
Florida	-\$116.028 b	-\$56.285 b	-\$34.018 b	-723,486
Georgia	-\$70.131 b	-\$31.794 b	-\$18.790 b	-376,188
Illinois	-\$92.318 b	-\$40.969 b	-\$24.523 b	-469,480
Michigan	-\$68.474 b	-\$29.392 b	-\$17.772 b	-339,595
New York	-\$119.938 b	-\$55.623 b	-\$33.181 b	-670,701
North Carolina	-\$68.647 b	-\$30.142 b	-\$17.937 b	-359,681
Ohio	-\$85.660 b	-\$37.144 b	-\$22.312 b	-429,828
Pennsylvania	-\$90.831 b	-\$39.549 b	-\$23.910 b	-458,848
Texas	-\$260.755 b	-\$100.989 b	-\$58.987 b	-1,027,969
Remaining States	-\$970.689 b	-\$432.825 b	-\$259.403 b	-5,166,642
Total, United States	-\$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.

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

Industry Sector	Real Total Expenditures	Real Gross Product	Real Personal Income	Job-Years
Agriculture	-\$16.511 b	-\$4.025 b	-\$2.720 b	-43,376
Mining	-\$4.044 b	-\$1.059 b	-\$0.598 b	-4,816
Utilities	-\$9.053 b	-\$2.079 b	-\$0.907 b	-3,843
Construction	-\$10.116 b	-\$4.962 b	-\$4.089 b	-57,657
Manufacturing	-\$80.300 b	-\$25.442 b	-\$14.367 b	-209,427
Wholesale Trade	-\$15.296 b	-\$10.351 b	-\$5.968 b	-66,737
Retail Trade*	-\$40.488 b	-\$27.703 b	-\$15.637 b	-552,332
Transportation & Warehousing	-\$12.370 b	-\$7.697 b	-\$5.090 b	-70,357
Information	-\$4.630 b	-\$2.802 b	-\$1.196 b	-10,576
Financial Activities*	-\$26.236 b	-\$7.793 b	-\$2.874 b	-28,619
Business Services	-\$10.160 b	-\$6.048 b	-\$4.934 b	-60,026
Health Services	+\$2.549 b	+\$1.584 b	+\$1.339 b	+22,114
Other Services	-\$39.758 b	-\$19.490 b	-\$13.985 b	-330,565
Total, All Industries	-\$266.413 b	-\$117.866 b	-\$71.027 b	-1,416,219

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

Industry Sector	Real Total Expenditures	Real Gross Product	Real Personal Income	Job-Years
Agriculture	-\$3.334 b	-\$0.847 b	-\$0.559 b	-8,856
Mining	-\$0.176 b	-\$0.061 b	-\$0.044 b	-387
Utilities	-\$3.730 b	-\$0.857 b	-\$0.374 b	-1,583
Construction	-\$6.363 b	-\$3.121 b	-\$2.572 b	-36,266
Manufacturing	-\$20.251 b	-\$6.538 b	-\$3.756 b	-54,932
Wholesale Trade	-\$7.263 b	-\$4.915 b	-\$2.834 b	-31,687
Retail Trade*	-\$24.427 b	-\$16.981 b	-\$9.636 b	-332,025
Transportation & Warehousing	-\$5.765 b	-\$3.587 b	-\$2.372 b	-32,790
Information	-\$1.532 b	-\$0.927 b	-\$0.396 b	-3,500
Financial Activities*	-\$17.194 b	-\$5.229 b	-\$1.984 b	-20,080
Business Services	-\$5.211 b	-\$3.102 b	-\$2.530 b	-30,786
Health Services	+\$1.644 b	+\$1.021 b	+\$0.864 b	+14,263
Other Services	-\$22.427 b	-\$11.142 b	-\$7.825 b	-184,857
Total, All Industries	-\$116.028 b	-\$56.285 b	-\$34.018 b	-723,486

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

Industry Sector	Real Total Expenditures	Real Gross Product	Real Personal Income	Job-Years
Agriculture	-\$1.199 b	-\$0.381 b	-\$0.221 b	-3,399
Mining	-\$0.175 b	-\$0.066 b	-\$0.049 b	-446
Utilities	-\$3.061 b	-\$0.703 b	-\$0.307 b	-1,299
Construction	-\$2.304 b	-\$1.130 b	-\$0.931 b	-13,134
Manufacturing	-\$26.057 b	-\$8.276 b	-\$4.592 b	-76,475
Wholesale Trade	-\$4.672 b	-\$3.162 b	-\$1.823 b	-20,384
Retail Trade*	-\$11.289 b	-\$7.784 b	-\$4.405 b	-153,734
Transportation & Warehousing	-\$4.385 b	-\$2.728 b	-\$1.805 b	-24,941
Information	-\$1.186 b	-\$0.718 b	-\$0.306 b	-2,710
Financial Activities*	-\$6.657 b	-\$2.130 b	-\$0.853 b	-8,740
Business Services	-\$2.629 b	-\$1.565 b	-\$1.277 b	-15,533
Health Services	+\$0.687 b	+\$0.427 b	+\$0.361 b	+5,958
Other Services	-\$7.203 b	-\$3.577 b	-\$2.580 b	-61,350
Total, All Industries	-\$70.131 b	-\$31.794 b	-\$18.790 b	-376,188

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, 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 Illinois

Industry Sector	Real Total Expenditures	Real Gross Product	Real Personal Income	Job-Years
Agriculture	-\$0.811 b	-\$0.198 b	-\$0.134 b	-2,131
Mining	-\$0.580 b	-\$0.175 b	-\$0.112 b	-958
Utilities	-\$3.944 b	-\$0.906 b	-\$0.395 b	-1,674
Construction	-\$2.655 b	-\$1.302 b	-\$1.073 b	-15,134
Manufacturing	-\$35.595 b	-\$10.646 b	-\$6.015 b	-86,433
Wholesale Trade	-\$6.447 b	-\$4.362 b	-\$2.515 b	-28,127
Retail Trade*	-\$13.689 b	-\$9.439 b	-\$5.342 b	-186,408
Transportation & Warehousing	-\$5.878 b	-\$3.658 b	-\$2.419 b	-33,434
Information	-\$0.992 b	-\$0.600 b	-\$0.256 b	-2,265
Financial Activities*	-\$8.876 b	-\$3.111 b	-\$1.352 b	-13,674
Business Services	-\$3.613 b	-\$2.151 b	-\$1.754 b	-21,347
Health Services	+\$1.062 b	+\$0.660 b	+\$0.558 b	+9,217
Other Services	-\$10.300 b	-\$5.082 b	-\$3.713 b	-87,113
Total, All Industries	-\$92.318 b	-\$40.969 b	-\$24.523 b	-469,480

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

Industry Sector	Real Total Expenditures	Real Gross Product	Real Personal Income	Job-Years
Agriculture	-\$1.205 b	-\$0.326 b	-\$0.207 b	-3,255
Mining	-\$0.443 b	-\$0.132 b	-\$0.083 b	-709
Utilities	-\$3.255 b	-\$0.748 b	-\$0.326 b	-1,382
Construction	-\$1.986 b	-\$0.974 b	-\$0.803 b	-11,321
Manufacturing	-\$30.841 b	-\$9.630 b	-\$5.782 b	-81,388
Wholesale Trade	-\$3.652 b	-\$2.472 b	-\$1.425 b	-15,936
Retail Trade*	-\$10.182 b	-\$7.075 b	-\$4.014 b	-138,409
Transportation & Warehousing	-\$2.644 b	-\$1.645 b	-\$1.088 b	-15,036
Information	-\$0.606 b	-\$0.367 b	-\$0.157 b	-1,385
Financial Activities*	-\$5.416 b	-\$1.773 b	-\$0.725 b	-7,283
Business Services	-\$2.515 b	-\$1.497 b	-\$1.221 b	-14,857
Health Services	+\$0.868 b	+\$0.539 b	+\$0.456 b	+7,528
Other Services	-\$6.597 b	-\$3.293 b	-\$2.396 b	-56,163
Total, All Industries	-\$68.474 b	-\$29.392 b	-\$17.772 b	-339,595

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

Industry Sector	Real Total Expenditures	Real Gross Product	Real Personal Income	Job-Years
Agriculture	-\$1.090 b	-\$0.275 b	-\$0.182 b	-2,890
Mining	-\$0.218 b	-\$0.074 b	-\$0.052 b	-458
Utilities	-\$6.039 b	-\$1.387 b	-\$0.605 b	-2,563
Construction	-\$4.703 b	-\$2.307 b	-\$1.901 b	-26,808
Manufacturing	-\$28.007 b	-\$8.919 b	-\$5.021 b	-75,066
Wholesale Trade	-\$7.155 b	-\$4.842 b	-\$2.792 b	-31,218
Retail Trade*	-\$20.382 b	-\$14.144 b	-\$8.021 b	-277,147
Transportation & Warehousing	-\$5.397 b	-\$3.358 b	-\$2.221 b	-30,698
Information	-\$2.562 b	-\$1.550 b	-\$0.662 b	-5,853
Financial Activities*	-\$19.401 b	-\$6.205 b	-\$2.471 b	-24,062
Business Services	-\$5.099 b	-\$3.036 b	-\$2.476 b	-30,129
Health Services	+\$1.995 b	+\$1.240 b	+\$1.048 b	+17,310
Other Services	-\$21.880 b	-\$10.765 b	-\$7.824 b	-181,119
Total, All Industries	-\$119.938 b	-\$55.623 b	-\$33.181 b	-670,701

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, 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 North Carolina

Industry Sector	Real Total Expenditures	Real Gross Product	Real Personal Income	Job-Years
Agriculture	-\$1.458 b	-\$0.401 b	-\$0.253 b	-3,960
Mining	-\$0.111 b	-\$0.041 b	-\$0.030 b	-272
Utilities	-\$2.323 b	-\$0.534 b	-\$0.233 b	-986
Construction	-\$2.593 b	-\$1.272 b	-\$1.048 b	-14,780
Manufacturing	-\$28.160 b	-\$8.541 b	-\$4.791 b	-72,027
Wholesale Trade	-\$3.913 b	-\$2.648 b	-\$1.527 b	-17,071
Retail Trade*	-\$11.271 b	-\$7.784 b	-\$4.407 b	-153,437
Transportation & Warehousing	-\$2.796 b	-\$1.740 b	-\$1.151 b	-15,903
Information	-\$0.854 b	-\$0.517 b	-\$0.221 b	-1,951
Financial Activities*	-\$6.034 b	-\$2.005 b	-\$0.830 b	-8,238
Business Services	-\$2.420 b	-\$1.441 b	-\$1.175 b	-14,300
Health Services	+\$0.709 b	+\$0.440 b	+\$0.372 b	+6,150
Other Services	-\$7.421 b	-\$3.659 b	-\$2.644 b	-62,904
Total, All Industries	-\$68.647 b	-\$30.142 b	-\$17.937 b	-359,681

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

Industry Sector	Real Total Expenditures	Real Gross Product	Real Personal Income	Job-Years
Agriculture	-\$0.933 b	-\$0.230 b	-\$0.154 b	-2,459
Mining	-\$1.281 b	-\$0.361 b	-\$0.219 b	-1,820
Utilities	-\$3.061 b	-\$0.703 b	-\$0.307 b	-1,299
Construction	-\$2.594 b	-\$1.272 b	-\$1.049 b	-14,786
Manufacturing	-\$37.792 b	-\$11.584 b	-\$6.738 b	-95,679
Wholesale Trade	-\$4.998 b	-\$3.382 b	-\$1.950 b	-21,806
Retail Trade*	-\$12.922 b	-\$8.902 b	-\$5.036 b	-176,000
Transportation & Warehousing	-\$4.228 b	-\$2.631 b	-\$1.740 b	-24,049
Information	-\$0.729 b	-\$0.441 b	-\$0.188 b	-1,665
Financial Activities*	-\$6.935 b	-\$2.436 b	-\$1.063 b	-10,985
Business Services	-\$2.787 b	-\$1.659 b	-\$1.354 b	-16,468
Health Services	+\$1.150 b	+\$0.714 b	+\$0.604 b	+9,977
Other Services	-\$8.550 b	-\$4.256 b	-\$3.117 b	-72,788
Total, All Industries	-\$85.660 b	-\$37.144 b	-\$22.312 b	-429,828

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

Industry Sector	Real Total Expenditures	Real Gross Product	Real Personal Income	Job-Years
Agriculture	-\$1.206 b	-\$0.306 b	-\$0.202 b	-3,202
Mining	-\$4.173 b	-\$1.126 b	-\$0.655 b	-5,351
Utilities	-\$3.797 b	-\$0.872 b	-\$0.381 b	-1,612
Construction	-\$3.006 b	-\$1.475 b	-\$1.215 b	-17,135
Manufacturing	-\$33.879 b	-\$10.239 b	-\$5.801 b	-85,055
Wholesale Trade	-\$4.627 b	-\$3.131 b	-\$1.805 b	-20,187
Retail Trade*	-\$12.906 b	-\$9.025 b	-\$5.131 b	-175,183
Transportation & Warehousing	-\$5.453 b	-\$3.393 b	-\$2.244 b	-31,012
Information	-\$0.894 b	-\$0.541 b	-\$0.231 b	-2,043
Financial Activities*	-\$7.334 b	-\$2.660 b	-\$1.192 b	-12,306
Business Services	-\$3.074 b	-\$1.830 b	-\$1.493 b	-18,165
Health Services	+\$1.352 b	+\$0.840 b	+\$0.710 b	+11,731
Other Services	-\$11.833 b	-\$5.792 b	-\$4.271 b	-99,331
Total, All Industries	-\$90.831 b	-\$39.549 b	-\$23.910 b	-458,848

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, 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

Industry Sector	Real Total Expenditures	Real Gross Product	Real Personal Income	Job-Years
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
Transportation & Warehousing	-\$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
Total, All Industries	-\$260.755 b	-\$100.989 b	-\$58.987 b	-1,027,969

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

Industry Sector	Real Total Expenditures	Real Gross Product	Real Personal Income	Job-Years
Agriculture	-\$24.504 b	-\$6.679 b	-\$4.227 b	-66,360
Mining	-\$24.817 b	-\$7.262 b	-\$4.549 b	-38,412
Utilities	-\$41.972 b	-\$9.640 b	-\$4.207 b	-17,815
Construction	-\$36.434 b	-\$17.871 b	-\$14.726 b	-207,666
Manufacturing	-\$331.880 b	-\$101.004 b	-\$56.653 b	-840,617
Wholesale Trade	-\$55.509 b	-\$37.563 b	-\$21.659 b	-242,190
Retail Trade*	-\$159.812 b	-\$111.470 b	-\$63.325 b	-2,170,540
Transportation & Warehousing	-\$46.397 b	-\$28.869 b	-\$19.093 b	-263,888
Information	-\$11.254 b	-\$6.809 b	-\$2.907 b	-25,705
Financial Activities*	-\$88.663 b	-\$30.062 b	-\$12.695 b	-128,105
Business Services	-\$33.469 b	-\$19.924 b	-\$16.253 b	-197,745
Health Services	+\$11.768 b	+\$7.311 b	+\$6.182 b	+102,101
Other Services	-\$127.746 b	-\$62.984 b	-\$45.290 b	-1,069,699
Total, All Industries	-\$970.689 b	-\$432.825 b	-\$259.403 b	-5,166,642

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

Industry Sector	Real Total Expenditures	Real Gross Product	Real Personal Income	Job-Years
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
Transportation & Warehousing	-\$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
Total, 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, Financial Activities includes Real Estate.

METHODS AND ASSUMPTIONS

The Perryman Group's scenario for the effects of COVID-19 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 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 US economy and its various regions. Allocations to states were developed based on the unique industrial structure of each state economy.

The US Multi-Regional Impact Assessment System and the US Multi-Regional Econometric Model are integrated in this dynamic analysis. These systems have been developed,

maintained, and expanded by TPG 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 approach facilitates evaluation of extensive detail across hundreds of industrial sectors.

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.

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.

OUR SERVICES

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We have developed and continually maintain an extensive set of economic impact evaluation models that can be applied in a variety of contexts.

EXPERT TESTIMONY

We help clients analyze and communicate complex information in common-sense terms through comprehensive, objective analyses and clear, concise expert reports and presentations.

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We are at the cutting edge of econometrics and other advanced statistical methods and have provided innovative approaches for many complex applications.

SPEECHES


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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