

TRANSPORTATION PLANNING DURING COVID-19: BUILDING DOT AND MPO RESPONSES TO A PANDEMIC

- Introduction
- Coronavirus and Transportation
- Key Questions
- Modeling Coronavirus
- Concluding Thoughts
- Q&A

“Coronavirus will have significant effect on the economy in the near term.”

Federal Reserve Chair Jerome Powell

“We know that many of our nation’s public transportation systems are facing extraordinary challenges...”

FTA Acting Administrator Jane Williams

“The impact on the economy is devastating, and what we’ve seen develop over the course of the last four or five weeks has really been a tidal wave coming across the state,”

Missy Hughes – Wisconsin EDC

Overview of Covid-19

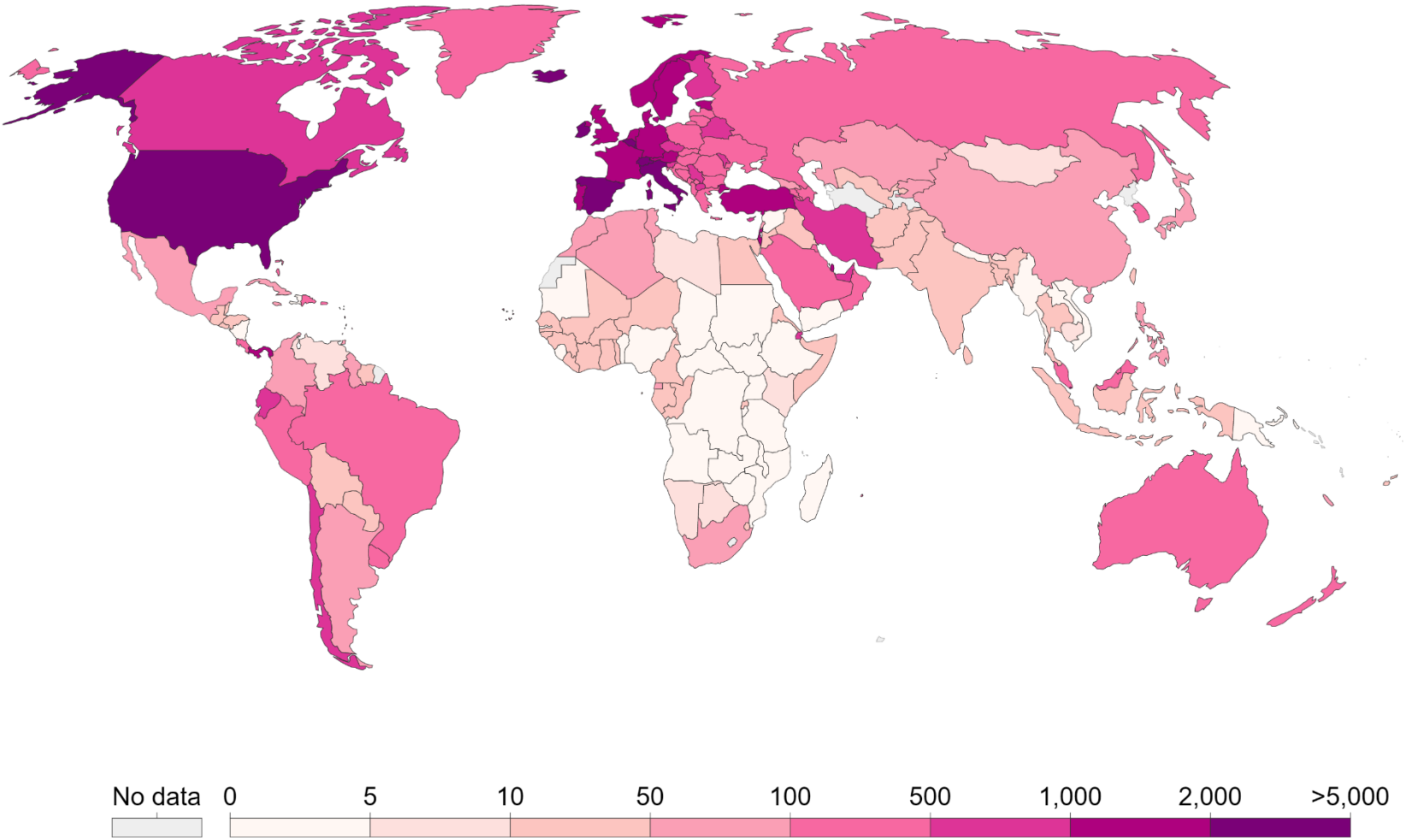
- ❑ Strain of SARS-CoV-1, which affected 8,000 in 2002/03
- ❑ Infects through eyes, nose, mouth > infiltrates cells in respiratory tract > replicates rapidly, sometimes triggering a dangerous immune response
- ❑ The virus spreads through tiny droplets leaving the respiratory system through breathing, coughing, or sneezing
- ❑ Soap kills the virus cells, and makes hands hard to stay on

Source: The Economist, 23rd January 2020; <https://www.bbc.co.uk/news/av/health-51883255/coronavirus-explained-in-60-seconds>;
<https://www.nytimes.com/interactive/2020/03/11/science/how-coronavirus-hijacks-your-cells.html>

Image: Alissa Eckert, Dan Higgins/CDC

Confirmed COVID-19 cases per million people, Apr 20, 2020

The number of confirmed cases is lower than the number of total cases. The main reason for this is limited testing.

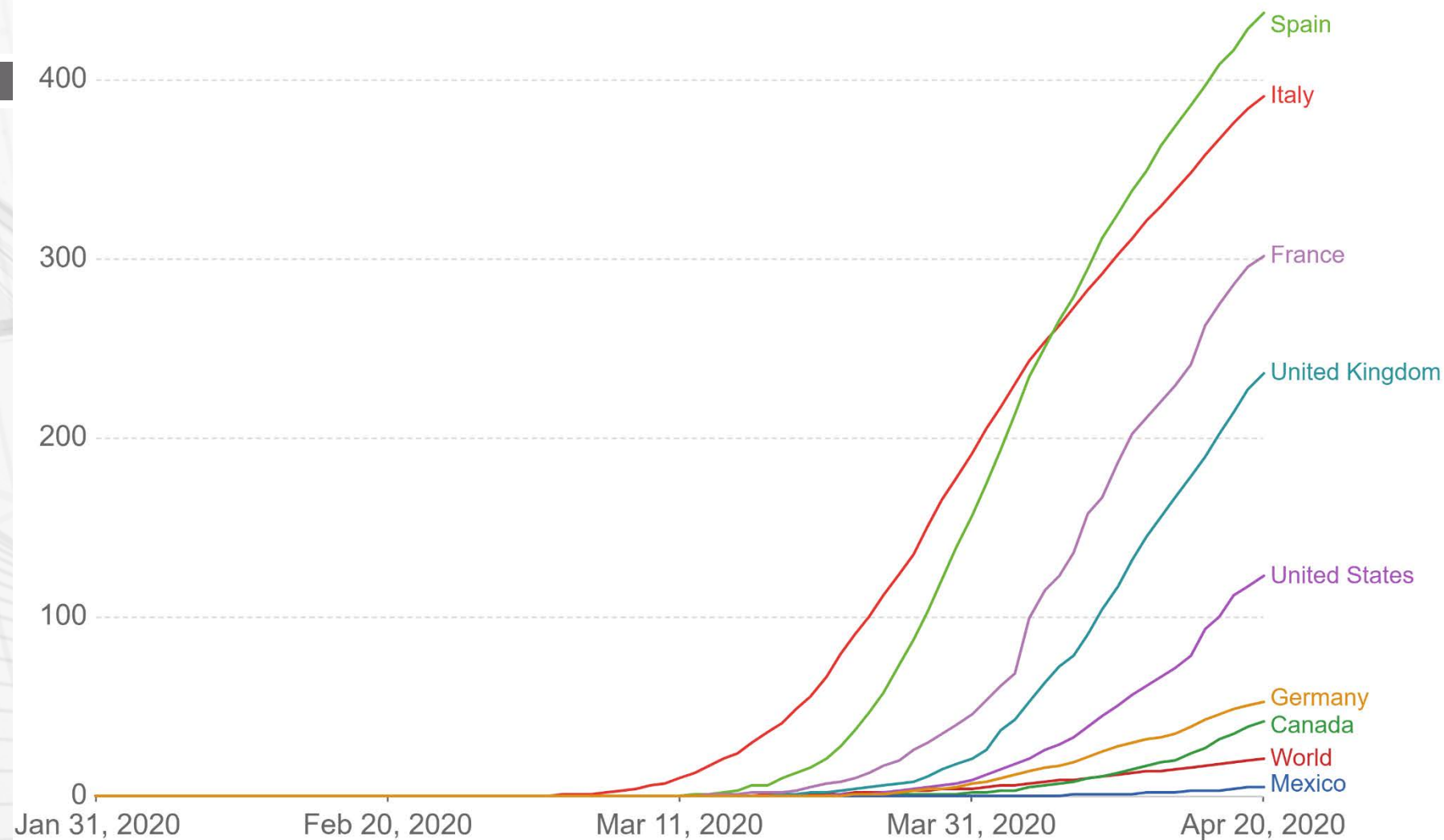


Source: European CDC – Situation Update Worldwide – Last updated 20th April, 11:30 (London time) OurWorldInData.org/coronavirus • CC BY

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Confirmed COVID-19 deaths per million people

Limited testing and challenges in the attribution of the cause of death means that the number of confirmed deaths may not be an accurate count of the true total number of deaths from COVID-19.



Source: European CDC – Situation Update Worldwide – Last updated 20th April, 11:30 (London time)

OurWorldInData.org/coronavirus • CC BY

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Covid-19 Timing

- When do states start relaxing rules?
 - ▣ Relieves economic pressure at the cost of greater risk
- What happens between the relaxation of rules and a vaccine?
 - ▣ Depends on unknown characteristics of Coronavirus
- What are the factors that influence timing?
 - ▣ Asymptomatic Population
 - ▣ Ability to monitor
 - ▣ Hospital Capacity
 - ▣ Supply chains
- Timelines
 - ▣ Peak healthcare demand – early April to late May
 - ▣ Vaccine – 12-18 Months

Sources:

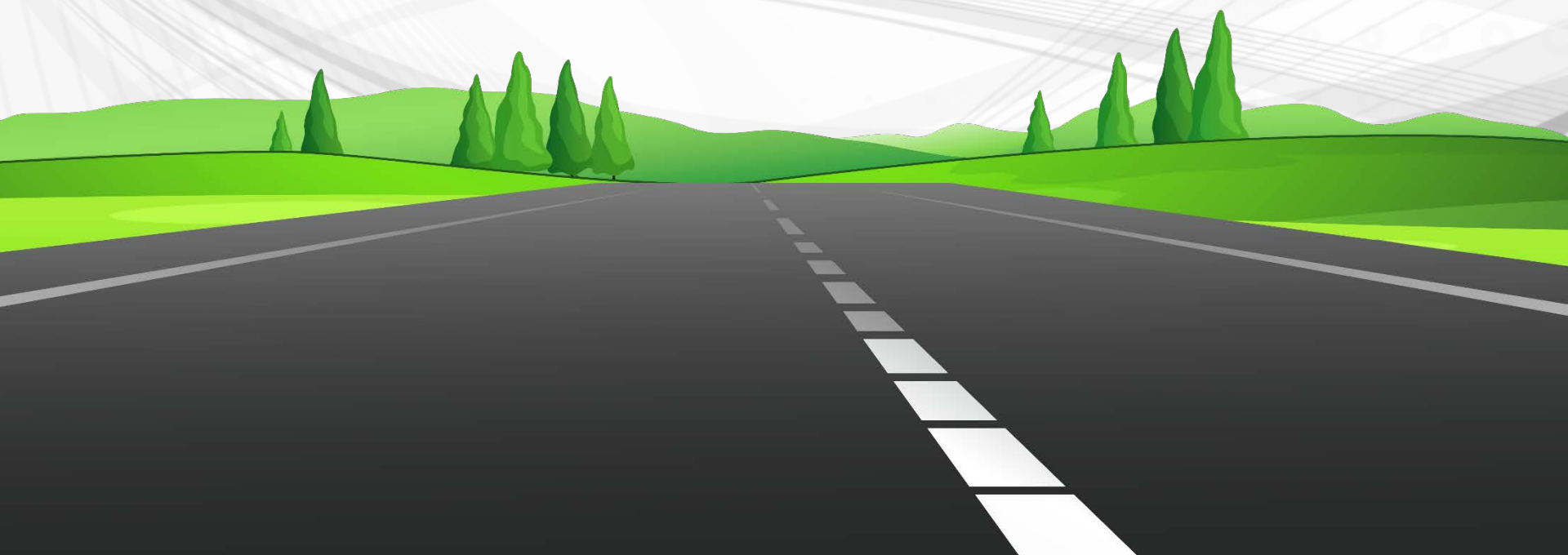
<https://www.theatlantic.com/health/archive/2020/04/pandemic-summer-coronavirus-reopening-back-normal/609940/>

Statement of Problem

- Health Crisis
 - ▣ Transportation ensures that communities can access needed goods and services
 - Transportation agencies must still provide these services while facing labor, supply, and funding challenges
- Economic Crisis
 - ▣ During an economic crisis, the provision of these services is even more critical
 - ▣ Infrastructure can be a key tool in responding to recessionary pressures

Addressing the Issue

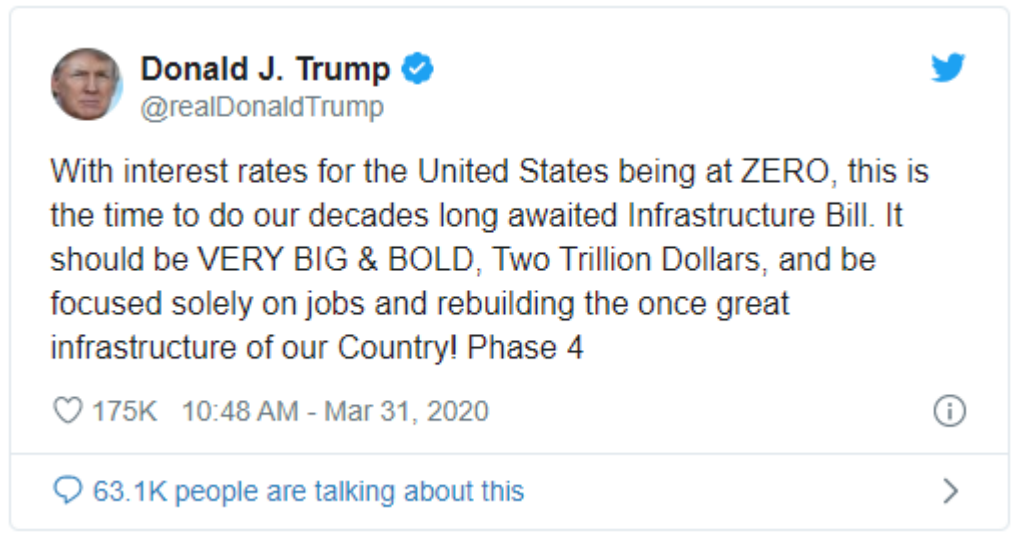
Economic and Demographic analysis can provide insights into issues at the intersection of health, transportation, public financing, and equity.



Recent News

- CARES Act

- \$25B transit funding to cover operational expenses since the beginning of the year



- Proposed Infrastructure Bill

- President Trump has called for a \$2T investment in infrastructure as part of the coronavirus relief package
- Democrats have also called for infrastructure investments, including rural broadband, public water systems, and hospital capacity
- Other features of the bill could be expanded paid leave and increased worker protections

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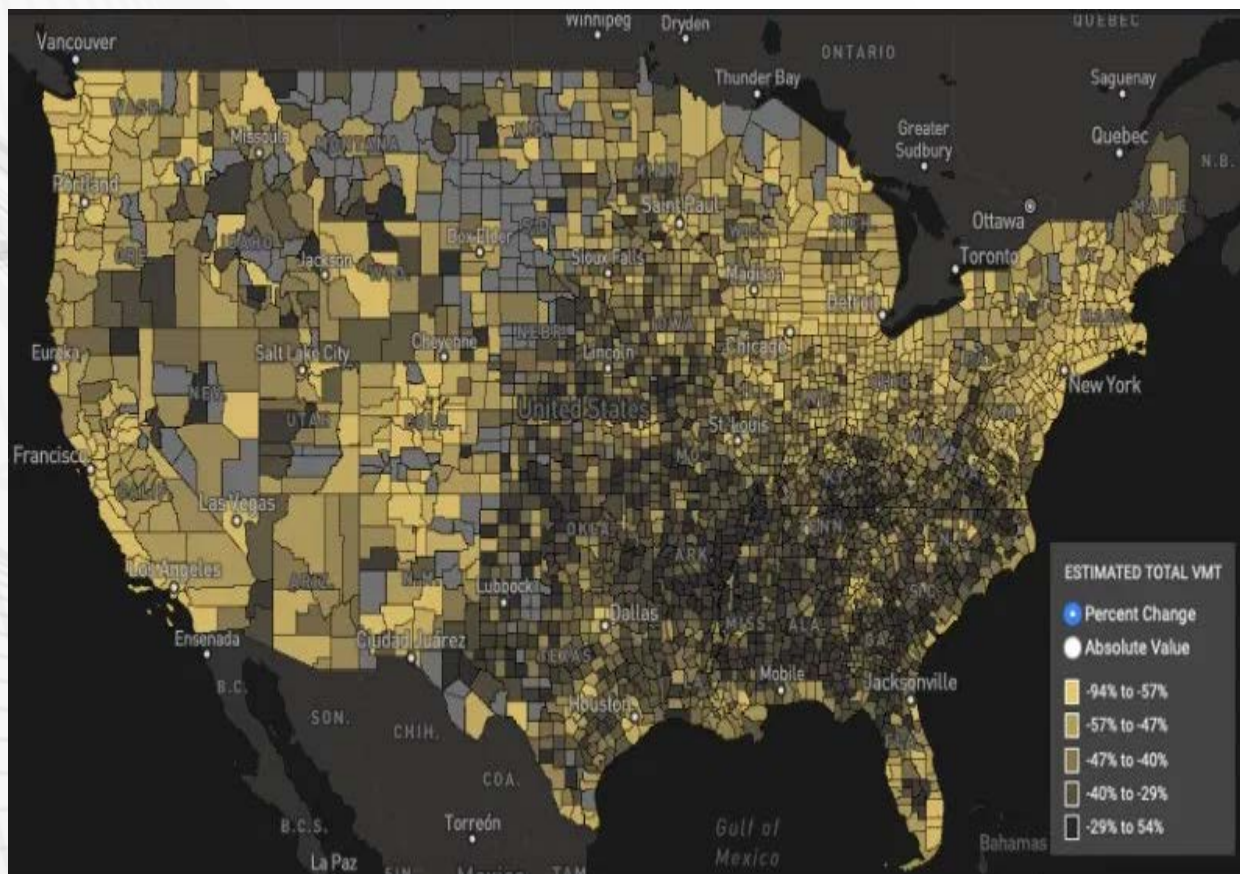
Sources: <https://thehill.com/homenews/administration/490353-trump-backs-infrastructure-bill-as-next-phase-of-coronavirus-relief>
<https://twitter.com/realDonaldTrump>

Funding

- ❑ Local Revenues often rely on sales tax, which are projected to decline in recession
- ❑ State and Federal Funds rely on gas tax, and with diminished travel, along with lower gas prices, these revenues are decreasing also
- ❑ Dual Question: How much will this hurt, and what can we do about it?

Gas Taxes: VMT Impacts

March 2 – March 27



Source: StreetLight Data and Cuebiq

San Francisco, CA
83% decrease

New York City, NY
67% decrease

Chicago, IL
67% decrease

Jacksonville, FL
46% Decrease

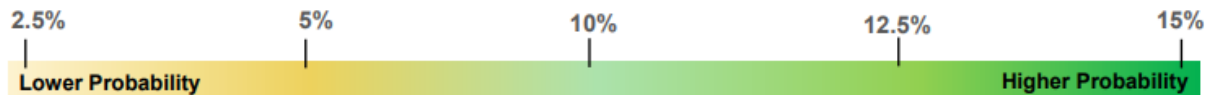
Montgomery, AL
32% decrease

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Sales Tax Forecasting

Table 4: Potential Loss of Taxable Retail Sales in the San Diego Region in the Short Term (2020 and 2021) due to COVID-19

Scenario (Recession) Type and Recovery	Back to Baseline	Scenario	Length of Disruption				
			2 months			3 months	
Disruption from March 15, 2020 through:			May 15			June 15	
Pre-COVID-19 Forecast			2020	2021		2020	2021
			\$63.1B	\$65.0B		\$63.1B	\$65.0B
COVID only (V)	July 2020	A	-\$5.5B -8.7%	\$0.0B 0.0%		-\$8.2B -12.9%	\$0.0B 0.0%
Mild (V)	July 2020	B	-\$6.0B -9.5%	-\$1.8B -2.8%		-\$7.3B -11.6%	-\$3.1B -4.7%
Moderate (V)	July 2021	C	-\$7.2B -11.4%	-\$3.0B -4.5%		-\$8.4B -13.3%	-\$4.2B -6.5%
Moderate (V-Long)	July 2022	D	-\$7.2B -11.4%	-\$4.6B -7.1%		-\$8.4B -13.3%	-\$5.8B -9.0%
Moderate (U)	July 2026	E	-\$7.2B -11.4%	-\$6.6B -10.1%		-\$8.4B -13.3%	-\$7.8B -12.1%
Severe (V)	July 2021	F	-\$9.9B -15.6%	-\$5.7B -8.7%		-\$11.0B -17.4%	-\$6.8B -10.4%
Severe (U)	July 2025	G	-\$9.9B -15.6%	-\$10.3B -15.8%		-\$11.0B -17.4%	-\$11.4B -17.6%



Source:

<https://www.sandag.org/index.asp?newsid=1202&fuseaction=news.detail>

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Forecasting: Overview

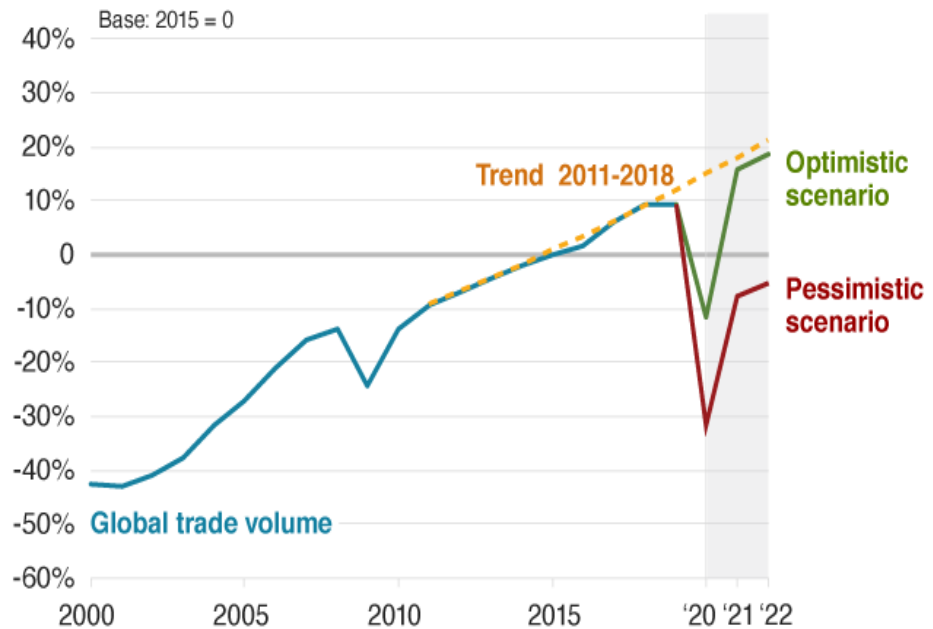
1. Modify Baseline National Forecast to Reflect National COVID-19 Slowdown/Recession Scenario
2. Use COVID-19 National Forecast to Drive State/Regional Forecast
3. Additional Modifications/What-Ifs for State/Region

Methods to Model Regional Effects of COVID-19

1. Change Employment, Output, Labor Productivity, by Industry
2. Consumer spending
3. Supply chain effects
4. Global demand impacts
5. Mortality rate impacts

World Trade set to plunge

Growth rate for global trade and WTO scenarios



Source: WTO secretariat

BBC

Work from Home

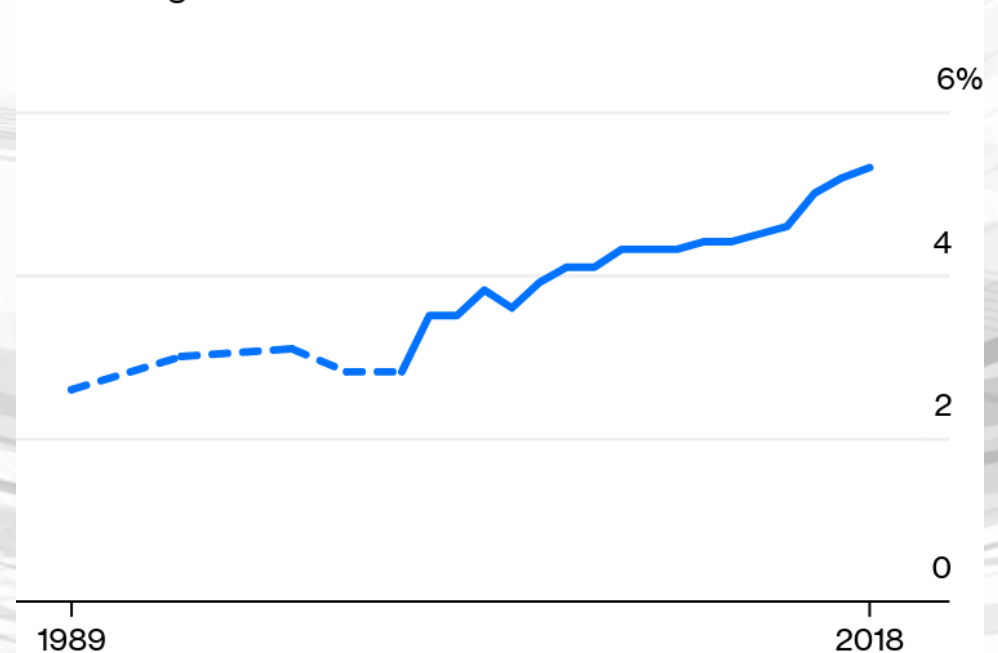
- Pre-existing trends
 - ▣ What was the baseline projection for WFH pre-covid?
 - ▣ How does WFH impact transportation demand during baseline conditions?
- How will it impact us in the future?
 - ▣ Changes in trend?
 - ▣ Changes in implications for transportation?
- The average commute in the U.S. recently hit [an all-time record](#) of 27 minutes one-way.

WFH Trend Growth

Global Workplace
Analytics projects
about 10% growth per
year pre-coronavirus

The Rise of Remote Work

Percentage of workers who work at home*



Sources: U.S. Bureau of Transportation
Statistics, Department of Housing and Urban
Development, Census Bureau

*Dotted lines represent years with no data.

BloombergOpinion

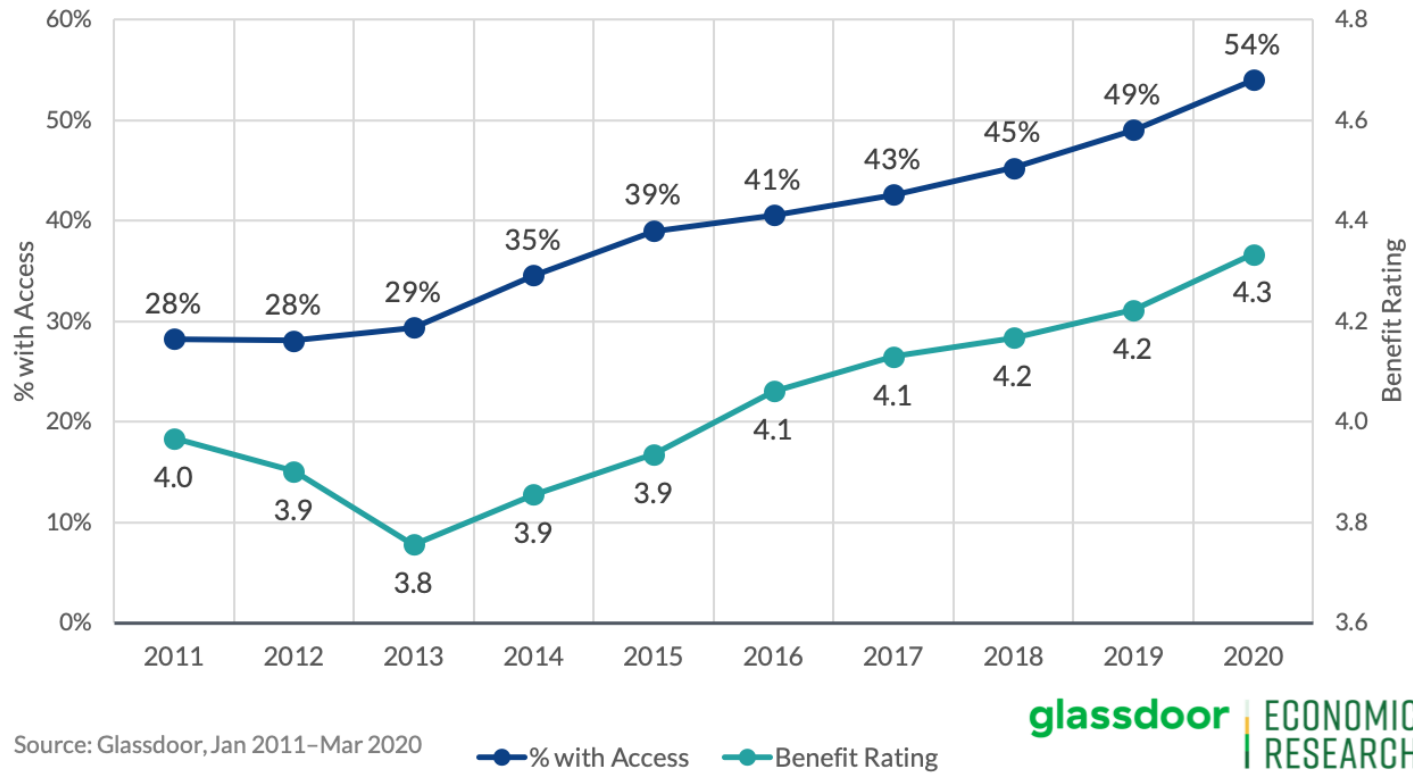
Source: <https://www.cnn.com/2020/03/23/what-coronavirus-means-for-the-future-of-work-from-home.html>

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WFH Supply Expansion

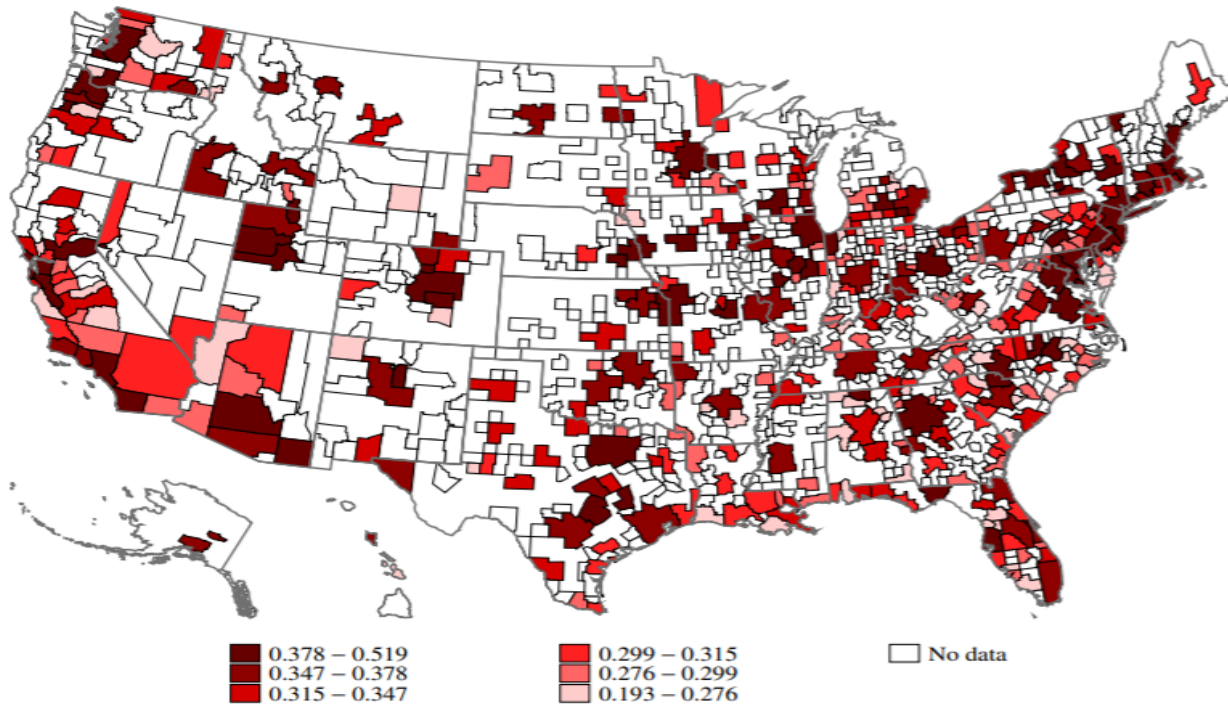
Access to Work from Home Benefits Has Doubled Since 2011

% with Access Increased from 28% to 54%, Rating Up at Decade High of 4.3



Feasibility to WFH in the US

Figure 1: Share of jobs that can be done at home



Study Finding:

37 percent (Upper Estimate) of U.S. jobs that can plausibly be performed at home

Source: Dingel, Jonathan, and Brent Neiman. "How Many Jobs Can Be Done at Home?" University of Chicago Becker Friedman Institute, 10 April 2020.

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Note: Results from University of Chicago study using responses from two Occupational Information Network surveys

Essential Workers Calculation

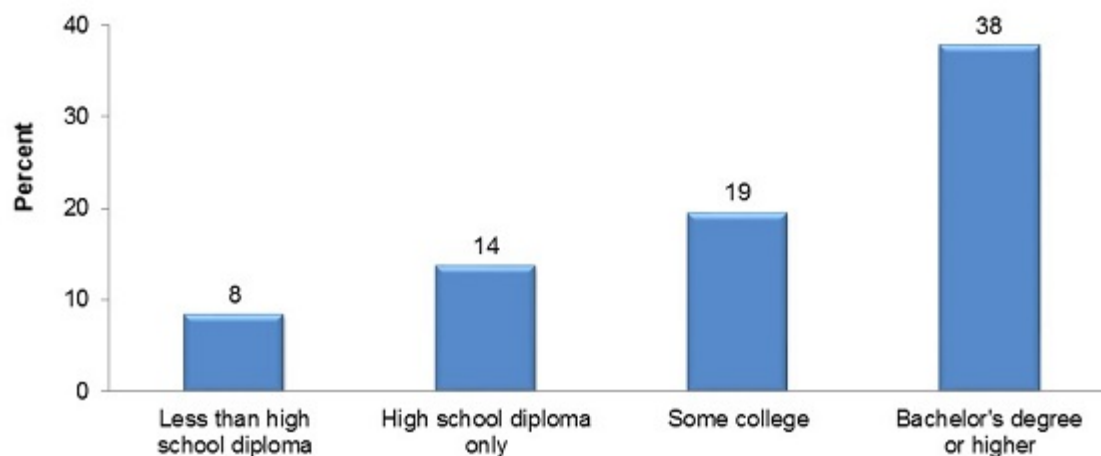
- About 2/3 of all workers are non-essential, and thus likely to be working from home.
- According to the [Bureau of Labor Statistics](#), only 29 percent of Americans can work from home – The Atlantic
- According to FHWA, commuting makes up 16% of all person trips, and 19% of all PMT
- Thus, at a maximum, we would see a 4% decrease in VMT resulting from WFHs – not taking into account decrease in shopping

Sources:

<https://www.theatlantic.com/ideas/archive/2020/03/coronavir-us-creating-huge-stressful-experiment-working-home/607945/>
<https://www.fhwa.dot.gov/policy/2015cpr/chap1.cfm>

Equity Implications

Percent of employed persons who worked at home on an average workday, by education level

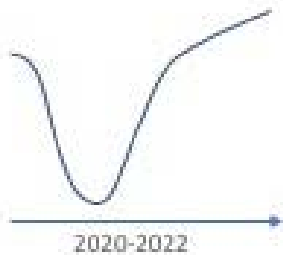


NOTE: Data include all employed persons age 25 and over on days they worked. Working at home includes any time persons did work at home and is not restricted to persons whose usual workplace is their home. Data include all days of the week and are averages for 2011-15.

SOURCE: Bureau of Labor Statistics, American Time Use Survey

Economic Recovery

- Whether the economy recovers quickly or slowly is unknown, and depends on the depth of damages to businesses and supply chains



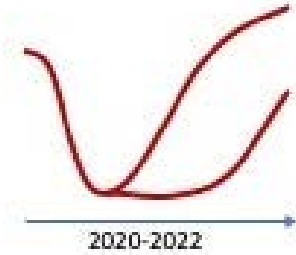
V-Shaped Recovery



U-Shaped Recovery



L-Shaped Recovery



Y-Shaped Recovery

Source: Art Kleiner

<https://medium.com/@kleiner.art/the-case-for-rebound-optimism-ca72b1a5664c>

Economic Recovery



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Economic Impacts

TranSight/Tax-PI – California and Rest of U.S.

70-Sector

7-Region

Across the Nation

REMI has been at the front lines of rapidly responding to and understanding economic implications and response strategies to the novel coronavirus COVID-19

COVID-19 Modeling Approaches

- Implication on states' economies/budgets
- Industry-specific impacts
- Federal, state, local response strategies
- Timing for re-opening

Arizona:
Economic
Impact of
COVID-19

Oklahoma: Covid-19
Response Measures

New York:
Economic/Fiscal
Impact



Nashville:
Local Business
Impacts

New Mexico:
DOE/Congressional study on
CARES, reopening, response
policies

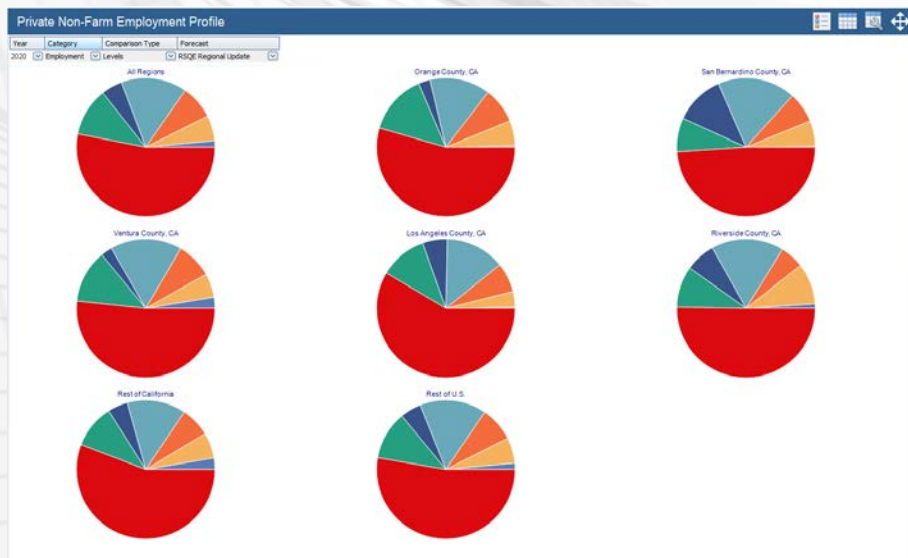
Missouri: Prioritizing
Industry Support

Conclusions

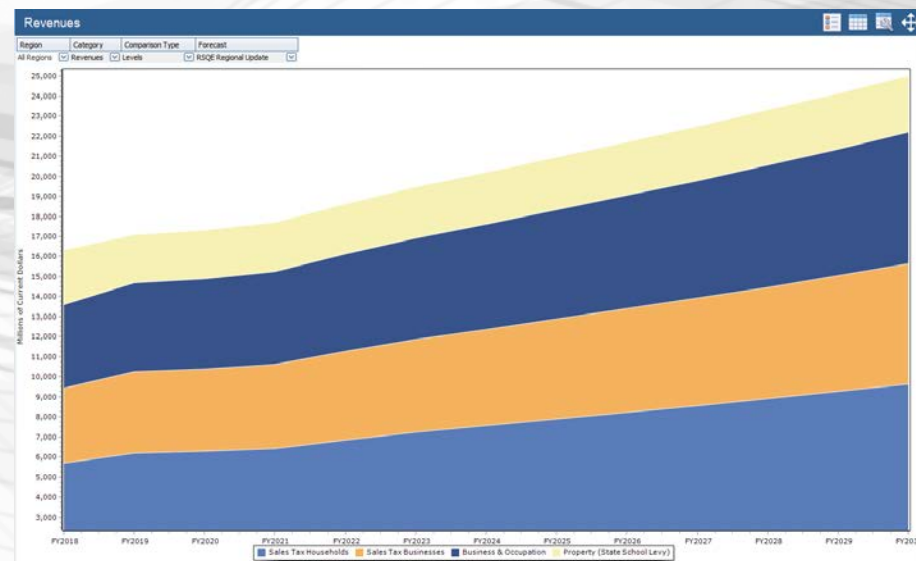
Trade Shares

Origin	Units	Destination						
		Orange County, CA	San Bernardino County, CA	Ventura County, CA	Los Angeles County, CA	Riverside County, CA	Rest of California	Rest of U.S.
Orange County, CA	Percent	70.490%	7.570%	2.347%	3.636%	6.512%	1.072%	0.228%
San Bernardino County, CA	Percent	1.169%	50.057%	0.830%	0.795%	4.093%	0.374%	0.061%
Ventura County, CA	Percent	0.393%	0.523%	53.745%	0.687%	0.460%	0.303%	0.051%
Los Angeles County, CA	Percent	7.482%	12.262%	12.766%	72.474%	8.768%	2.893%	0.668%
Riverside County, CA	Percent	0.623%	3.646%	0.470%	0.746%	52.672%	0.372%	0.053%
Rest of California	Percent	2.789%	5.378%	6.586%	2.749%	6.617%	72.890%	1.381%
Rest of U.S.	Percent	8.861%	11.726%	13.954%	10.470%	12.715%	13.375%	88.384%
Rest of World	Percent	8.194%	8.838%	9.302%	8.444%	8.163%	8.719%	9.173%
Demand	Percent	100.000%	100.000%	100.000%	100.000%	100.000%	100.000%	100.000%

Employment Profile



Revenues



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Interesting Articles

- On the potential pitfalls of WFH -
<https://www.vox.com/2020/3/20/21187469/work-from-home-coronavirus-productivity-mental-health-nicholas-bloom>
- When does everything go back to normal?
<https://www.theatlantic.com/health/archive/2020/04/pandemic-summer-coronavirus-reopening-back-normal/609940/>