

*North Marin Breakfast Club*

# Driving Change – Autonomous Vehicles’ Big Impact & Coronavirus Economics

National Economic Education Delegation

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September 25, 2020



1

## National Economic Education Delegation

- **Vision**

- One day, the public discussion of policy issues will be grounded in an accurate perception of the underlying economic principles and data.

- **Mission**

- NEED unites the skills and knowledge of a vast network of professional economists to promote understanding of the economics of policy issues in the United States.

- **NEED Presentations**

- Are **nonpartisan** and intended to reflect the consensus of the economics profession.



2

2

## Who Are We?

- **Honorary Board: 52 members**

- 2 Fed Chairs: Janet Yellen, Ben Bernanke
- 6 Chairs Council of Economic Advisers
  - Furman (D), Rosen (R), Bernanke (R), Yellen (D), Tyson (D), Goolsbee (D)
- 3 Nobel Prize Winners
  - Akerlof, Smith, Maskin

- **Delegates: 520+ members**

- At all levels of academia and some in government service
- All have a Ph.D. in economics
- Crowdsource slide decks
- Give presentations

- **Global Partners: 45 Ph.D. Economists**

- Aid in slide deck development

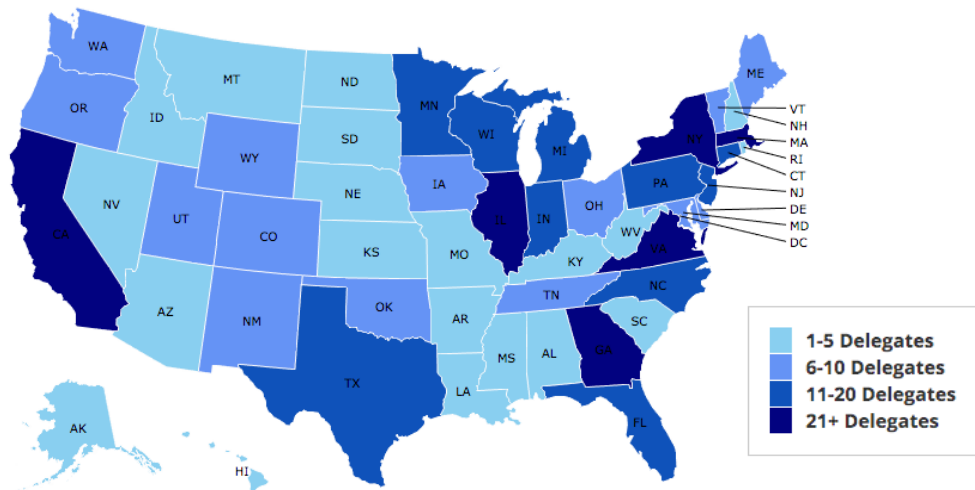


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3

3

## Where Are We?



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4

4

## Available NEED Topics Include:

- Coronavirus Economics
- US Economy
- Climate Change
- Economic Inequality
- Economic Mobility
- Trade and Globalization
- Trade Wars
- US Social Policy
- Immigration Economics
- Housing Policy
- Federal Budgets
- Federal Debt
- 2017 Tax Law
- Autonomous Vehicles

5

## Credits – Autonomous Vehicles

- **This slide deck was authored by:**
  - Jon Haveman, NEED
- **This slide deck was reviewed by:**
  - Ronald Fisher, Michigan State University
  - William F. Fox, University of Tennessee, Knoxville
- **Disclaimer**
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6

# Outline

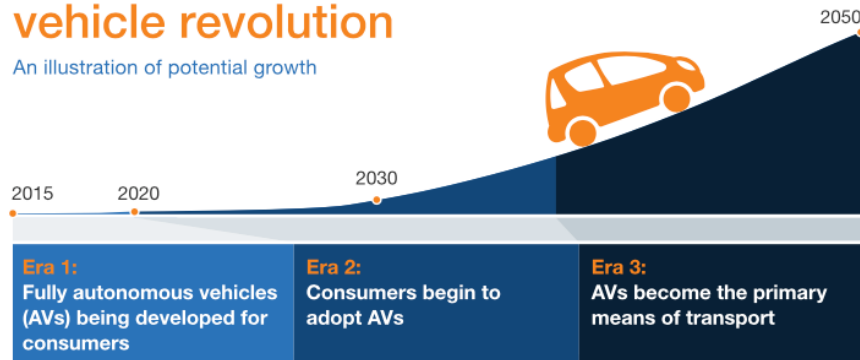
- Where does the AV path lead?
- Transition
- Policy/Planning Issues
- Major Economic/Development Changes

7

# Growth Path

## The self-driving vehicle revolution

An illustration of potential growth



McKinsey & Company

8

## Two Important Questions:

1. When will Transportation as a Service (TaaS) be available?
2. How quick will the transition be?

9

## WHEN?

### What do the headlines say?



NVIDIA to introduce level-4  
enabling system by 2018



**Audi**

Audi to introduce a self-  
driving car by 2020



**Volkswagen**

Volkswagen expects first  
self driving cars on the  
market by 2019



First autonomous Toyota  
to be available in 2020



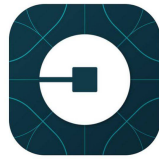
**TESLA MOTORS**

Elon Musk now expects  
first fully autonomous  
Tesla by 2019, approved by  
2021

10

# Wildly Optimistic, But...

## 40+ Corporations Working On Autonomous Vehicles



WAYMO



TESLA



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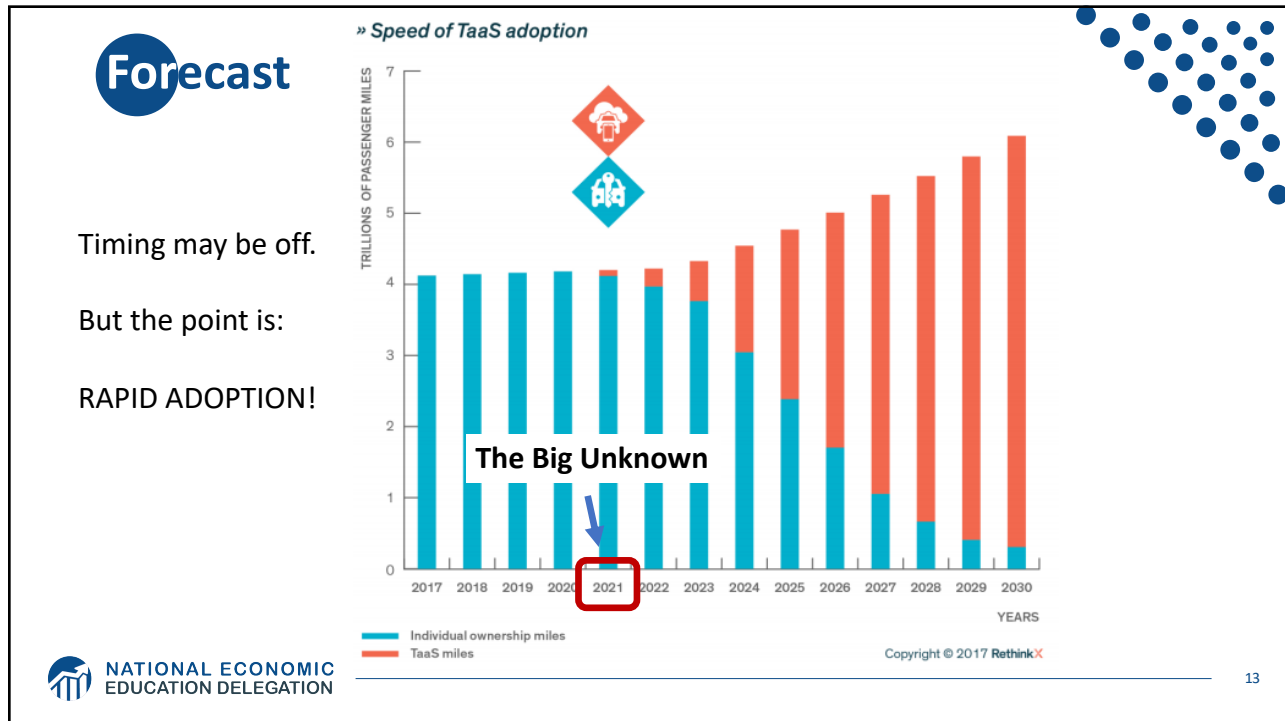
# WHEN?

## What is possible?

- By 2025
- Potentially 95% of VMT by 2035.
- Last 5% is going to be very difficult to achieve.
- Is this possible?
  - Horses to cars: 10 years – early 1900s
  - But adoption of EVs is so slow!
  - Adoption of AVs will be rapid.



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# What will the future look like?

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**This:**



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**But, will it be:**



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# H

- **Primarily individual private car ownership**
  - Much as today
- **Combustion engines**
- **Why Hell?**
  - Dramatically increased VMT and pollution
  - Potentially increased congestion
  - Parking



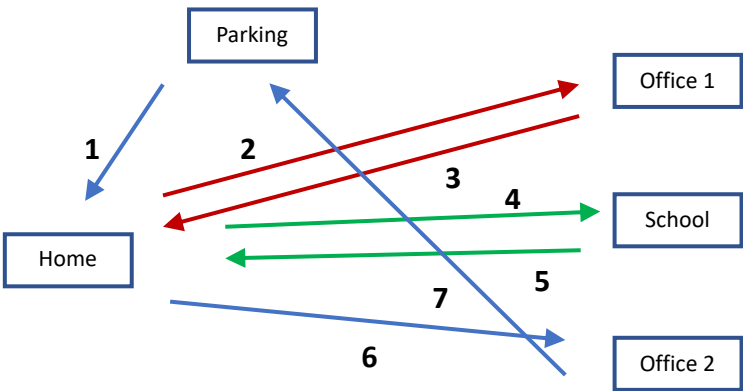


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# T

## Two Adults and a Child: Morning Miles



*And this is just the morning.....*



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## Heaven



- **Vehicle ownership will be very limited**
  - Private ownership for those with specialized vehicle needs.
  - Fleet ownership will serve everybody else.
- **Engines: electric**
- **Insurance: product liability**
- **Not clear when we will get there, but this is the likely model.**
  - 2030 for widespread adoption in many regions.



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## Why is this Heaven?

- **Not only autonomous, but:**
  - Shared
  - Connected
  - Green
- **Far fewer cars in existence.**
  - Better resource utilization.
- **VMT could go up or down, but more productive than in Hell.**
- **Congestion effects – unclear, but likely reduced.**
  - Right-sized vehicles, platooning, sharing, V2V communication
- **Minimal need for parking.**



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## Economics Drives Transition: Private

- **Adoption dividend for private individuals**
  - Eliminate car ownership
    - Ave annual cost of owning a car: \$9,282
    - Cost per mile will fall: \$0.59 to \$0.19
  - Repurpose your garage
    - \$50,000 from transition to bedroom
- **Time recovery**
  - 50% of SF Bay Area workforce has a commute in excess of 30 minutes
- **It will become too annoying to drive around all of those autonomous vehicles!**

## Economics Drives Transition: Public

- **Economic and social costs associated with human drivers are enormous:**
  - ACCIDENTS:
    - Drive 25% of congestion
    - Result in 40,000 deaths
    - And 2 million injuries
    - 90+% caused by human error
  - Costs of human drivers estimated at \$0.8 to \$1.3 TRillion each year



## Public Policy/Planning Issues

- **Government buy-in:**
  - Essential – gov't must encourage progress
  - Difficult – because of displacement issue
- **Important transitional issues:**
  - What infrastructure should be developed?
  - What to do about public transportation?
  - What to do with all of the parking spaces?



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## Planning

- **Respond to the coming changes**
  - Adjust the planning horizon for any investment in transportation infrastructure.
    - It may have gotten **MUCH** shorter.
- **Encourage the changes to happen more quickly**
  - Mobility, safety, productivity, and environmental benefits abound.



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# Encourage Change

- **Mobility and equity considerations**
  - Elderly/disabled/impovertished
- **Safety:** only way to reduce traffic fatalities is by coordinated effort
- **Productivity:** reduced congestion
- **Environment:** speed transition to electric vehicles

These are all societal benefits that come about too slowly if the private market is left to itself.



# Environment



## What Changes Will This Bring?

- Disposable Income
- Government Finances
- Transportation demand
- Infrastructure
- Public Transportation
- Employment
- Parking
- Housing

Potentially dramatic improvements in infrastructure planning and maintenance - Data sharing and integration



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## Employment

- **Massive job displacement/relocation (Millions!):**
  - Drivers of all varieties: truck, taxi, delivery...
  - Car production jobs, car parts production jobs
  - Gas station, vehicle repair, and body shop
  - Police and fire
  - Health care workers
  - And so on...

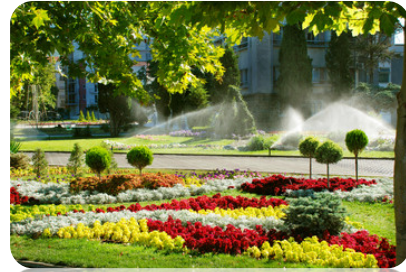


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## Parking

- **Greatly reduced demand for parking lots.**
- **Service providers will own parking lots in strategic places.**
  - where the cost of land is low
- **Street parking will largely be a thing of the past.**
  - More green space in cities
- **Shopping mall parking will be converted to:**
  - More shopping mall? Housing?
- **Apartment complexes will convert parking.**



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## Housing



- **Housing is suddenly easier to build**
  - Issue of traffic congestion is significantly reduced
  - Space for new housing is available where parking lots used to be
- **Existing houses can now accommodate more people:**
  - garage to bedroom conversions



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## Freeing Up Urban Space from Parking

- **Los Angeles: 14% of incorporated land area**
  - 200 Square miles
- **San Francisco: 275,450 on-street parking spaces**
  - Enough to parallel-park a line of cars 60 miles.
    - California's entire coastline is 840-miles.
- **Nationwide: (estimate) 500 million spaces**
  - That's larger than Delaware and Rhode Island combined.
  - Could be as many as 2 billion (add in Connecticut and Vermont).



31

## Summary of Change

- **Massive employment upheaval**
- **Local government finances will look very different**
- **Housing will be easier to build and more plentiful**
- **Parking conversions will be commonplace**
- **Demand for transportation infrastructure will likely decline**
  - Transportation infrastructure technology will be a booming business
- **Demand for public transportation may well decline**



32



# Credits and Disclaimer – Coronavirus Economics

• **This slide deck was authored by:**

- Jon D. Haveman, NEED
- Scott Baier, Clemson University
- Geoffrey Woglom, Amherst College (Emeritus)

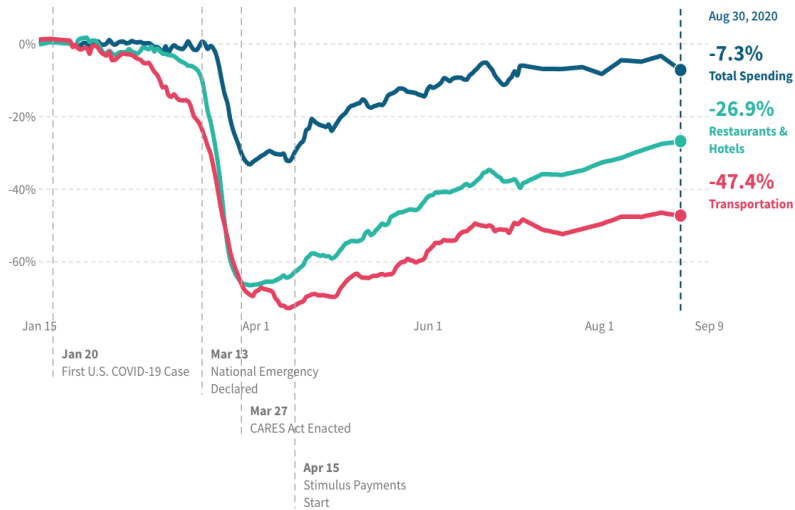
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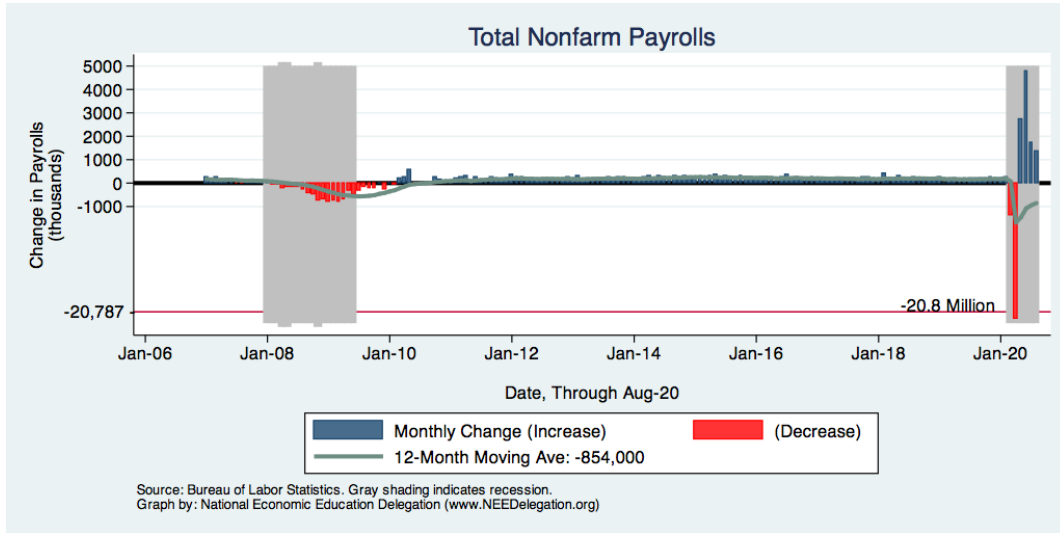
# Spending is (was?) on the Rise

In the United States, as of August 30 2020, total spending by all consumers decreased by **7.3%** compared to January 2020.



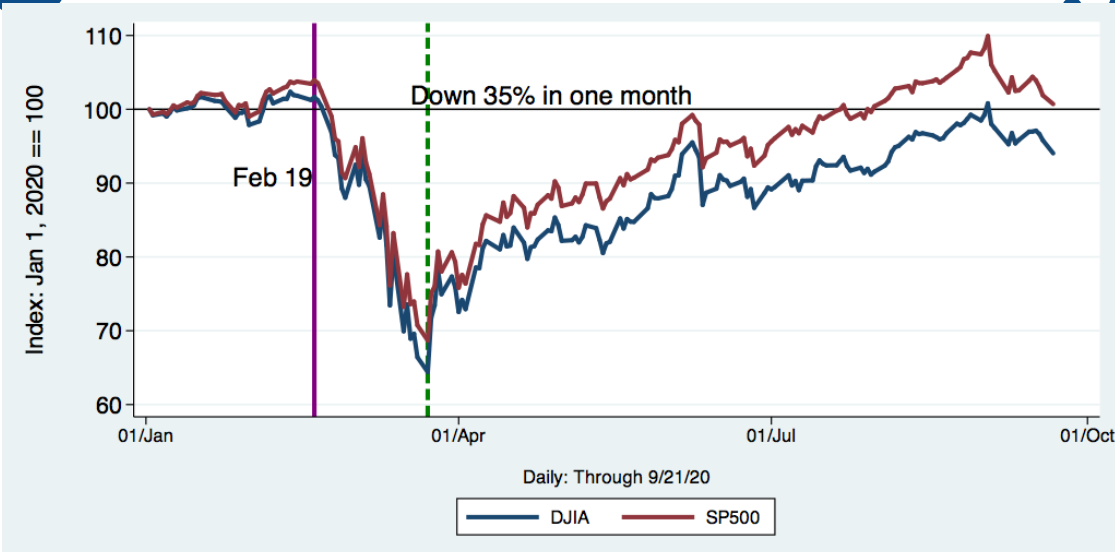
34

# Monthly Changes in Nonfarm Employment



35

# DJIA and S&P 500



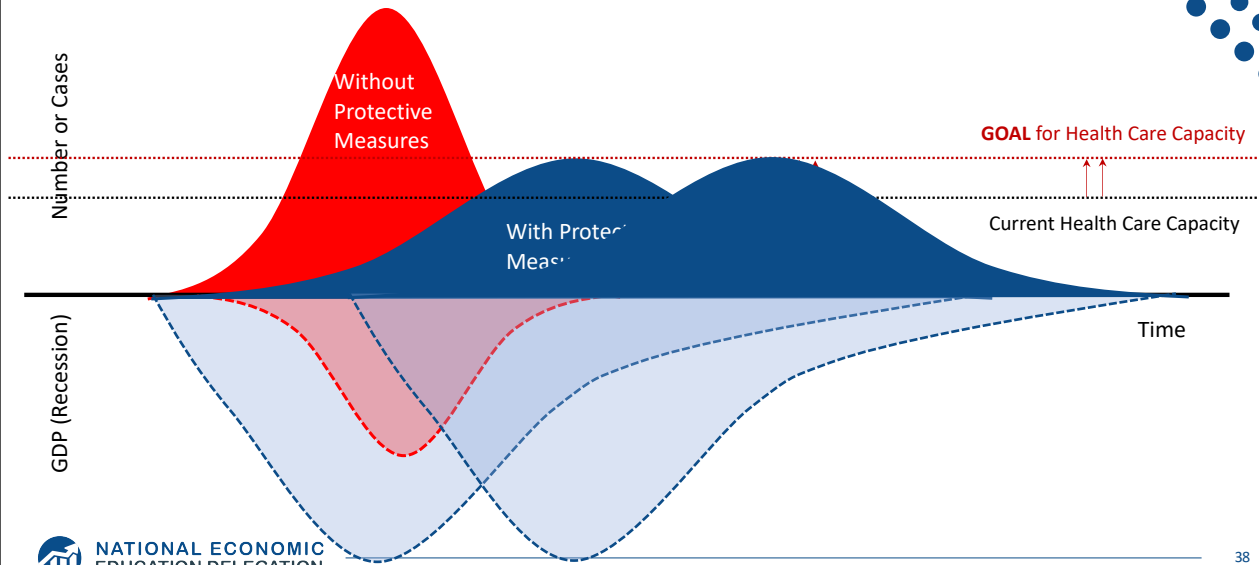
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# A Tale of Three Policies Efforts

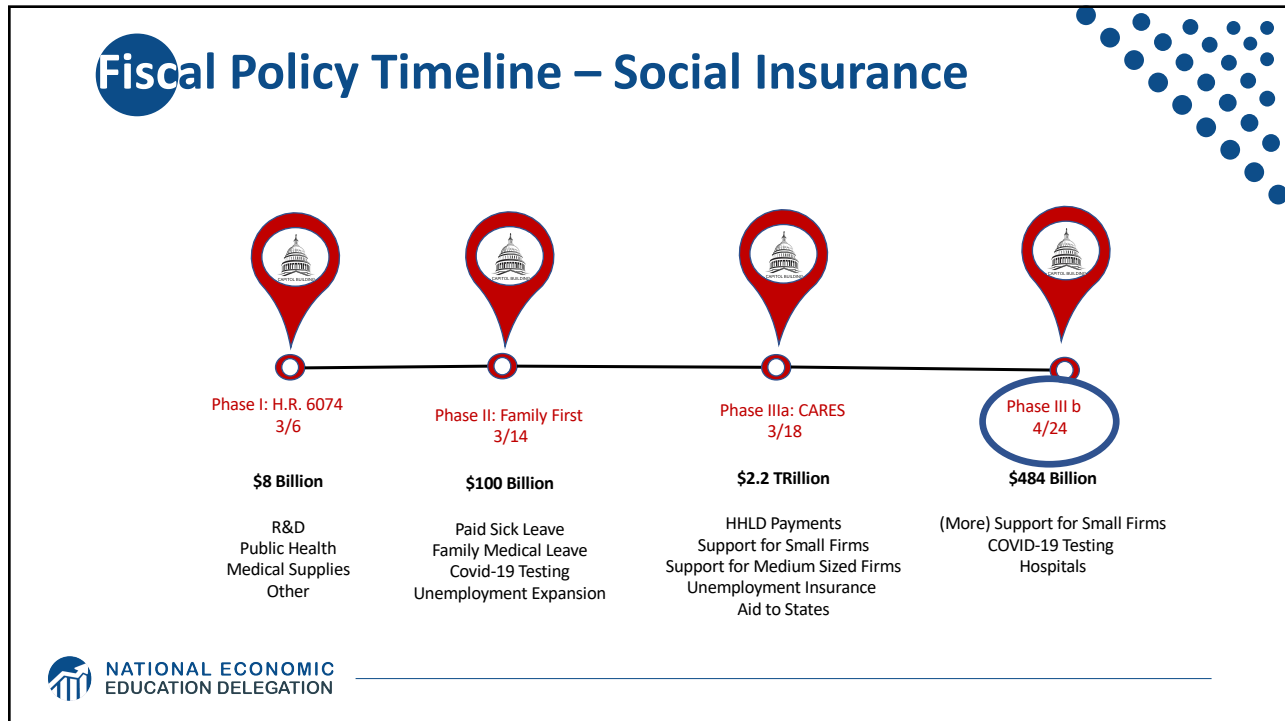
- Social policy: Social Distancing
- Fiscal Policy
- Monetary Policy

37

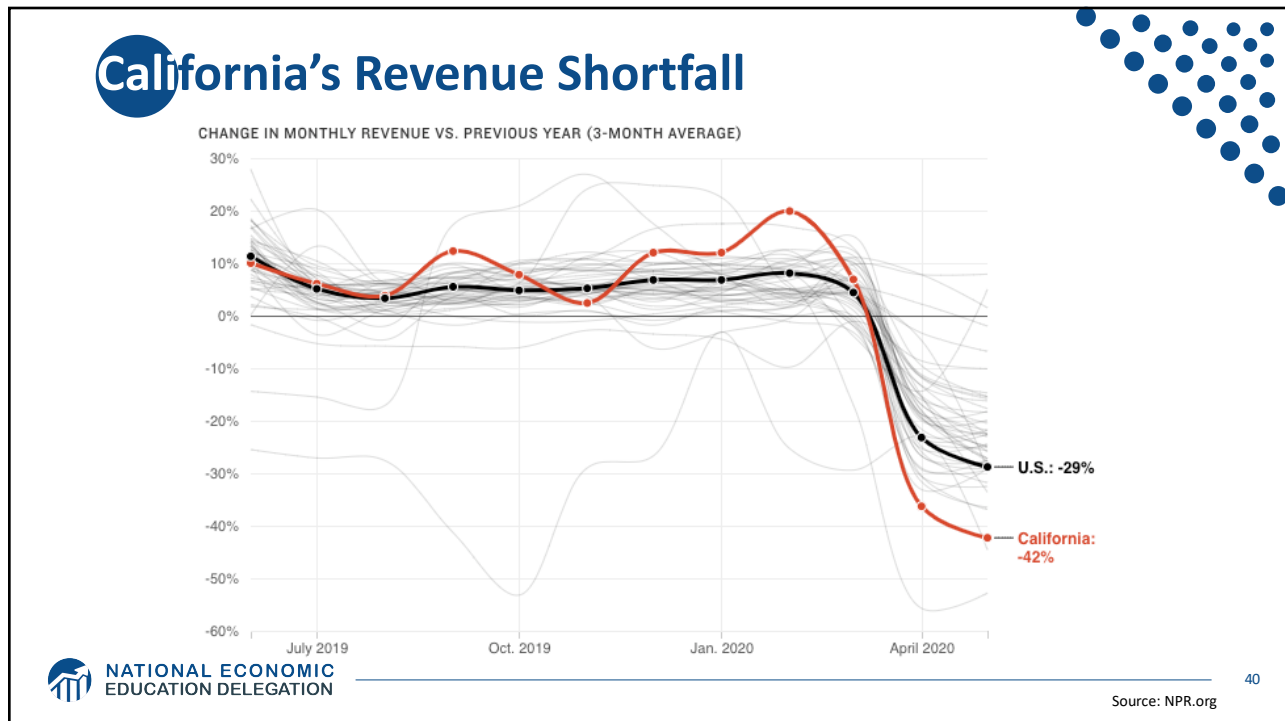
# Flattening the Curve and Lengthening the Recession



38



39



40

## Skimny Republican Stimulus (~\$500b)

### Major Spending Provisions:

- Continue Expanded Unemployment, but at \$300 extra per week
- \$105b for education, 2/3<sup>rd</sup> for K-12
- \$45b for testing, tracing and vaccine production
- Extend PPP at least for the \$285b and perhaps more

### Sweeteners:

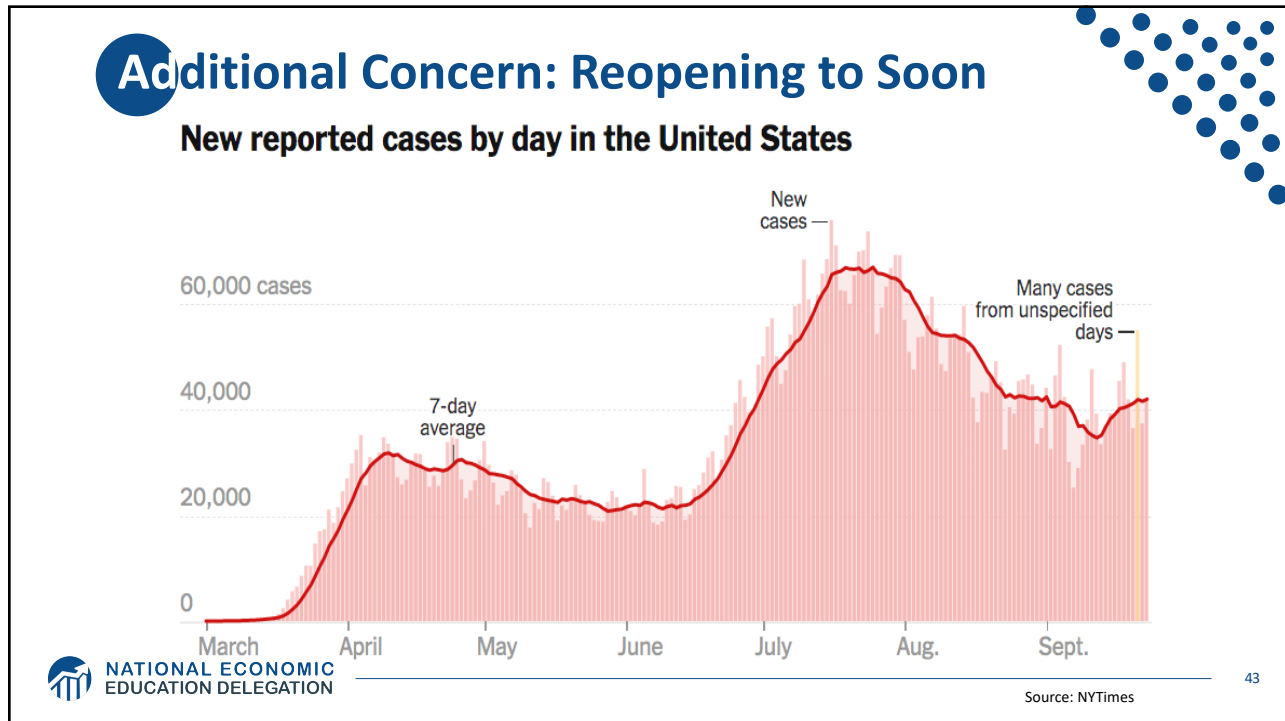
- **Business Liability Protection:** cannot be sued unless 'gross negligence' or 'willful misconduct' can be proved
- **Post Office Funding:** \$10b loan turned into a grant.



## What is Missing?

1. Second Round \$1200 payments, \$435b
2. Reducing \$600 per week to \$300 per week, \$180b.
3. Flexible aid to State and Local Governments, \$1t
4. Housing and Rental Assistance, \$200b





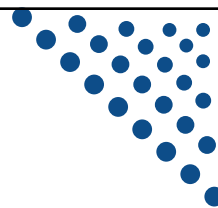
43

## Conclusion

- **COVID-19 is health crisis that has macroeconomic implications.**
  - With enormous built-in inequities.
- **GDP will likely contract between 6.0 and 9.0 percent this year.**
  - Positive growth will likely return in 2021
- **Policy gap will create enormous hardship.**
  - Hunger, evictions, foreclosures, additional deaths.
  - Loss of GDP: 4-5%                      Unemployment: up 4-5 pts.
- **It might just be time to shut down again.**
  - For both our health and the economy.

44

**Thank you!**



## Any Questions?

[www.NEEDelegation.org](http://www.NEEDelegation.org)

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