RESEARCH FOR
EQUITY IN RECOVERY

# Does COVID-19 Accelerate Automation?

## Federal Reserve Bank of Philadelphia

September 17, 2020

12:00 noon–1:15 p.m. ET

# Thank You to Our Cohosts:

RESEARCH FOR EQUITY IN RECOVERY

W.E. UPJOHN INSTITUTE FOR EMPLOYMENT RESEARCH

PennIUR
PENN INSTITUTE *for* URBAN RESEARCH

FEDERAL RESERVE BANK OF PHILADELPHIA

# Legal Notices and Disclaimer

RESEARCH FOR EQUITY IN RECOVERY

**The information, analyses, and conclusions set forth are those of the presenters and do not necessarily reflect the views of the Federal Reserve Bank of Philadelphia or the Federal Reserve System.**

# Housekeeping

RESEARCH FOR EQUITY IN RECOVERY

- The webinar is being recorded.
- Recording and presentations will be posted online afterward.
- All participants are muted.
- Type your questions into the Q&A box at any time.

# Today's Panelists

RESEARCH FOR EQUITY IN RECOVERY

**Ashley Putnam**, Director, Economic Growth and Mobility Project, FRB Philadelphia

**David H. Autor**, Professor, MIT

**Lei Ding**, Senior Economic Advisor, FRB Philadelphia

**Anne Gemmell**, Founder, Future Works Strategy; formerly Director of Special Initiatives, City of Philadelphia

Moderator: **Susan Wachter**, Codirector, Penn Institute for Urban Research, University of Pennsylvania

# The Nature of Work After the COVID Crisis: Too Few Low-Wage Jobs

David Autor and Elisabeth Reynolds

MIT Department of Economics and Task Force on the Work of the Future
MIT Industrial Performance Center and Task Force on the Work of the Future

September 17, 2020

# Four Durable Effects of COVID Crisis on Labor Market

RESEARCH FOR EQUITY IN RECOVERY

1. Telepresence
2. De-densification
3. Firm concentration
4. Automation forcing

# Telepresence is a Form of Automation (Mindell 2015)




- Share of work done from home certain to be greater going forward
  - Telecommuting, virtual reality business meetings, distance medicine, remote learning U.S. employers project tripling of share of working days from home (Altig, Barrero, Bloom, Davis, Meyer, Mihaylov, and Parker 2020)
- Increase primarily among top quartile of higher-educated workers (Dingel and Nieman 2020)

# Telepresence Will Indirectly Affect Many Jobs



- Telepresence could lead to declines in low-wage end of "barbell economy"
  - One in four U.S. jobs accounted for by workers without postsecondary credentials who provide personal and business services
  - Permanent decline in time spent outside home, business travel, will threaten these jobs
- Reallocation out of low-wage occupations is not good news in disguise
  - Decline in low-wage work will not raise demand for middle-paid jobs
  - Absence of high-pressure labor markets will stymie economic recovery

# Occupations with Most Projected New Jobs, 2018–2028

## Concentrated in Typically Low-Paid In-Person Services

RESEARCH FOR EQUITY IN RECOVERY

| OCCUPATION | NUMBER OF NEW JOBS (PROJECTED), 2018-28 | 2018 MEDIAN PAY |
|---|---|---|
| Personal care aides | 881,000 | $24,020 per year |
| Combined food preparation and serving workers, including fast food | 640,100 | $21,250 per year |
| Registered nurses | 371,500 | $71,730 per year |
| Home health aides | 304,800 | $24,200 per year |
| Cooks, restaurant | 299,000 | $26,530 per year |
| Software developers, applications | 241,500 | $103,620 per year |
| Waiters and waitresses | 170,200 | $21,780 per year |
| General and operations managers | 165,000 | $100,930 per year |
| Janitors and cleaners, except maids and housekeeping cleaners | 159,800 | $26,110 per year |
| Medical assistants | 154,900 | $33,610 per year |
| Construction laborers | 148,100 | $35,800 per year |
| Laborers and freight, stock, and material movers, hand | 144,000 | $28,260 per year |
| Market research analysts and marketing specialists | 139,200 | $63,120 per year |
| Nursing assistants | 135,400 | $28,540 per year |
| Management analysts | 118,300 | $83,610 per year |
| First-line supervisors of food preparation and serving workers | 107,200 | $32,450 per year |
| Landscaping and groundskeeping workers | 106,400 | $29,000 per year |
| Financial managers | 104,700 | $127,990 per year |
| Heavy and tractor-trailer truck drivers | 99,700 | $43,680 per year |
| Medical secretaries | 96,400 | $35,760 per year |

**These 20 jobs**

- Account for 4.6M of projected 8.4M net jobs
- That's 55 %

**Concentrated in**

- Health aides
- Food and cleaning services
- Laborer occupations

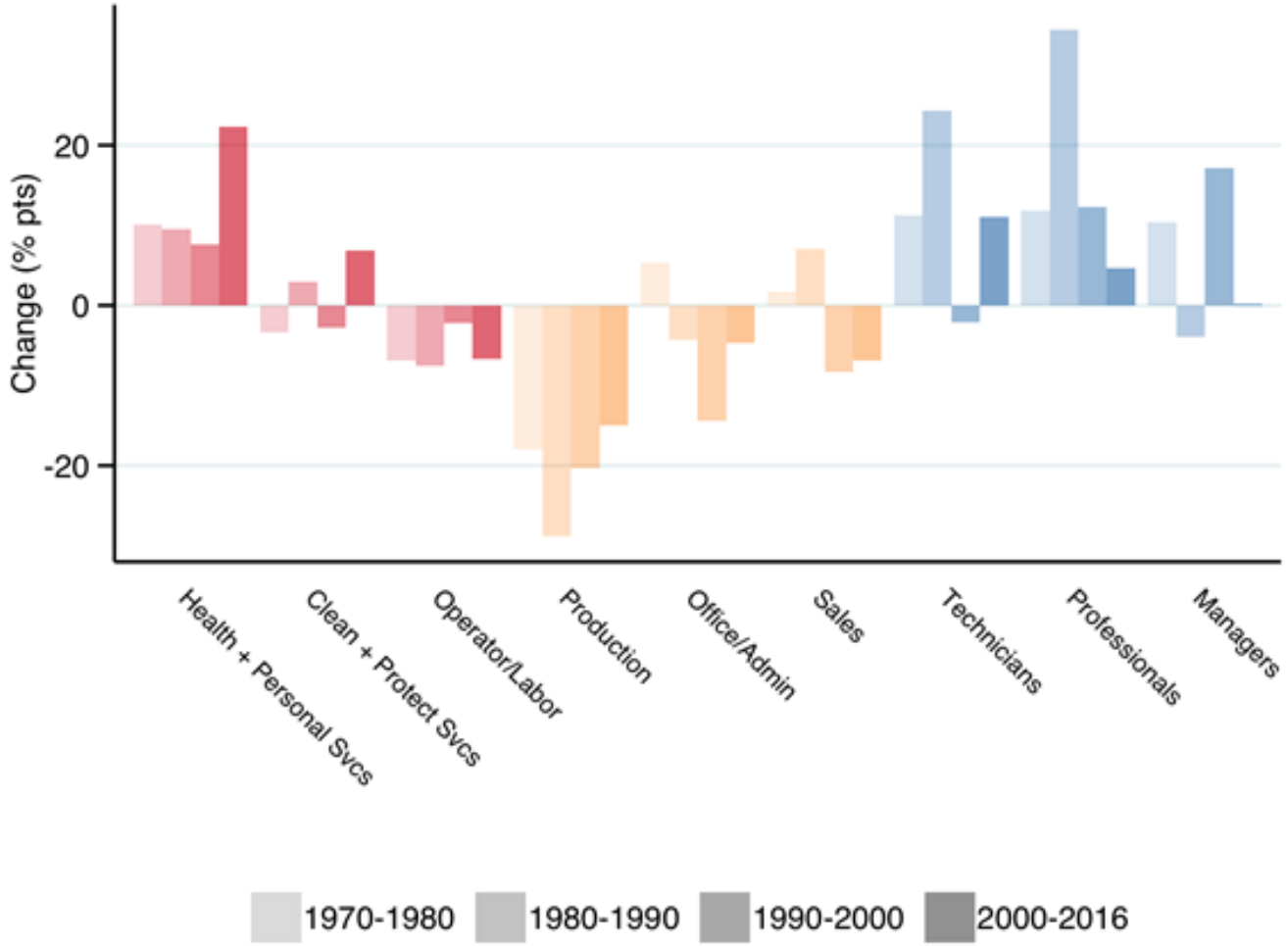
**Mostly**

- Non-college
- Below median wage

# The Barbell of U.S. Employment Growth, 1970–2016

## Rapid Growth in High-Paid and Low-Paid Occupations

RESEARCH FOR EQUITY IN RECOVERY



# Four Durable Effects of COVID Crisis on Labor Market

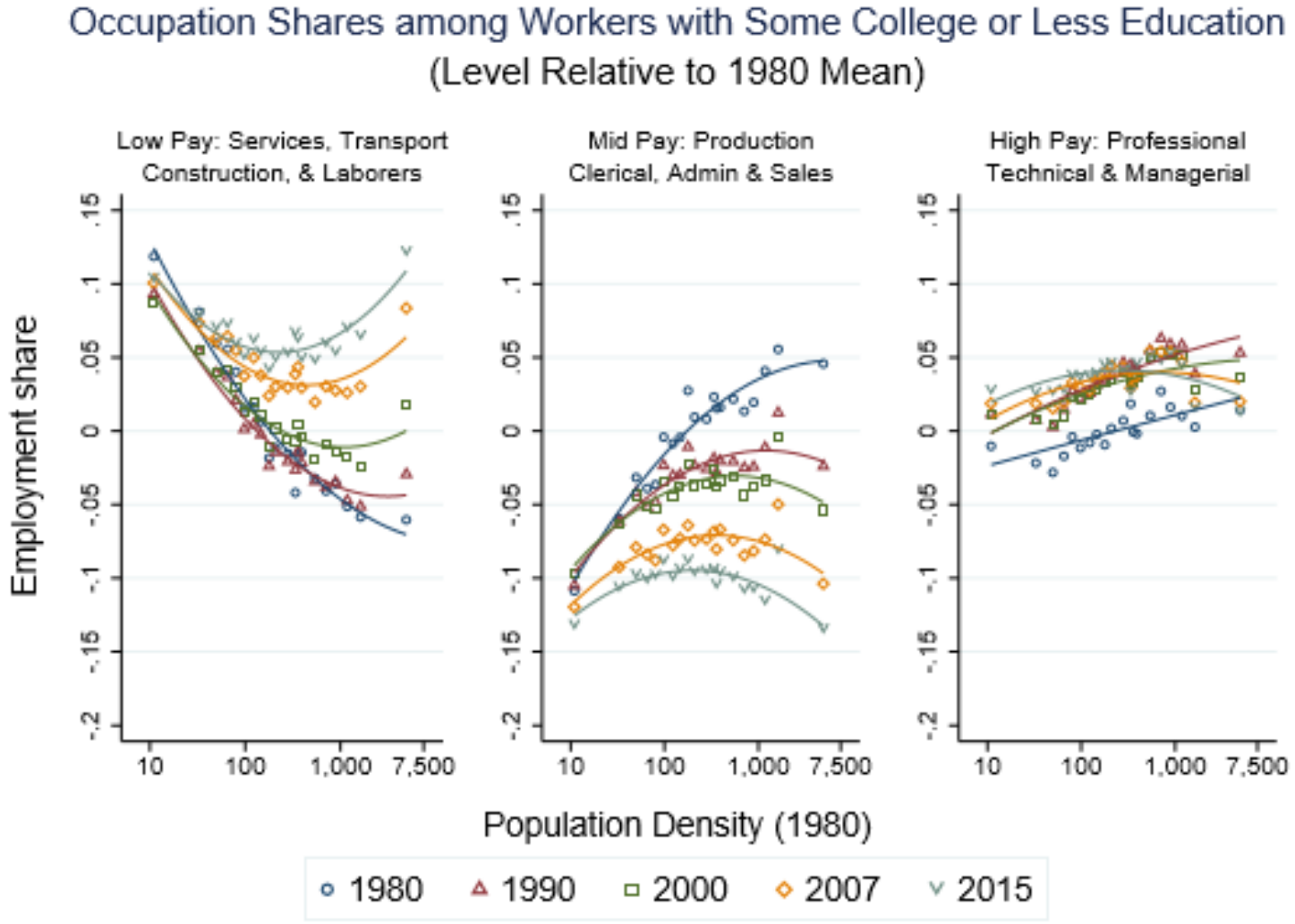
RESEARCH FOR EQUITY IN RECOVERY

1. Telepresence
2. **De-densification**
3. Firm concentration
4. Automation forcing

# Urban De-Densification

## Since 1980, Most Urban Non-College Job Growth Concentrated in Personal Services

RESEARCH FOR EQUITY IN RECOVERY




Does COVID-19 Accelerate Automation?

# Urban De-Densification



- COVID-induced changes in work patterns will alter character of cities
  - Long-term reductions in office occupancy and commuting will affect economic structure of urban life
  - Disruptions will fall heavily on urban low-paid workers in personal services occupations
- COVID crisis will moderate — rather than reverse — economic trends over past 30 years
  - Rise in urban rents
  - Relocation of corporations to both marquee and mid-sized cities
  - Shift in GDP toward a handful of superstar cities (Glaeser 2011; Hsieh and Moretti 2019)
- Texture of suburban life may also change in opposite direction

# Four Durable Effects of COVID Crisis on Labor Market



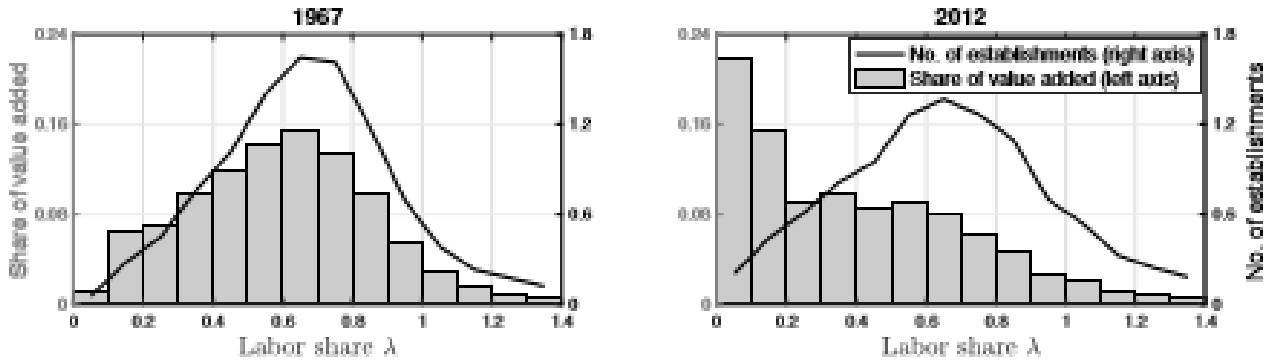
1. Telepresence
2. De-densification
3. **Firm concentration**
4. Automation forcing

# Employment Concentration in Large Firms

RESEARCH FOR EQUITY IN RECOVERY

## Large Firms Have Lower Labor Shares (i.e. Are More Capital-Intensive) and Account for a Rising Share of Value-Added

Figure I: The Changing Distributions of Labor Shares and Value Added




*Note:* The solid black line (right axis) reflects the raw cross-establishment distribution of labor shares, while the distribution of value added is represented by the gray bars (left axis). The labor share on the x-axis is expressed as a decimal.

Kehrig and Vincent, 2020

## COVID Crisis Will Increase Economic Weight of Large Firms

- This will further depress labor's share of national income
- That share has fallen 5% to 7% since 2000

# Employment Concentration in Large Firms

RESEARCH FOR EQUITY IN RECOVERY

- COVID crisis likely to disproportionately cull the ranks of small firms
  - Small businesses lack liquidity and access to credit markets (Walsh 2020)
  - Months of inactivity could lead to wave of business closures
- Will accelerate trend of rising dominance of large firms (Rose 2020)
  - Reallocation of economic activity from small and mid-size businesses to large firms
- Will reinforce reduction in labor's share in U.S. since 2000 (Autor, Dorn, Katz, Patterson, and Van Reenen 2020)
  - Large firms tend to pay a smaller share of earnings to workers
  - Implies a rise in earnings inequality as well as greater concentration of aggregate income

# Four Durable Effects of COVID Crisis on Labor Market

RESEARCH FOR EQUITY IN RECOVERY

1. Telepresence
2. De-densification
3. Firm concentration
4. **Automation forcing**

# Automation Forcing



MIT Warehouse Disinfecting Robot

**Many Examples of Automation-Forcing**

1. Drones delivering medical supplies
2. Warehouse disinfecting robots
3. Human temperature checking drones
4. Meat-packing
5. Labor-saving reorganization

# Automation Forcing



- Firms have discovered new ways to accomplish more with less human labor
- Not all innovations are technological in conventional sense
  - Reconfiguration of manufacturing lines (MIT Work of the Future Task Force)
- Firms will not unlearn labor-saving methods from COVID crisis
  - Labor surplus following crisis may temporarily blunt this adjustment
  - But labor-saving innovations will be waiting when labor markets eventually tighten again

# Summary: After the Crisis, Too Few Low-Wage Jobs

RESEARCH FOR EQUITY IN RECOVERY

1. Likely change in demand for services
   - Reduced business travel (decline in hospitality sector)
   - More telecommuting (reduced cleaning, security, food service)
   - Shrunken retail sector
2. Reduced centrality of cities for “knowledge” work (?)
3. Reallocation of sales + value-added towards large firms
4. Slack job market: ↓ wage pressure in low-paid services
5. One wildcard: A rise in early retirement?

RESEARCH FOR
EQUITY IN RECOVERY

# "Forced Automation" by COVID-19? Early Trends from Current Population Survey Data

Lei Ding and Julieth Saenz Molina

Federal Reserve Bank of Philadelphia
September 17, 2020

# Disclaimer

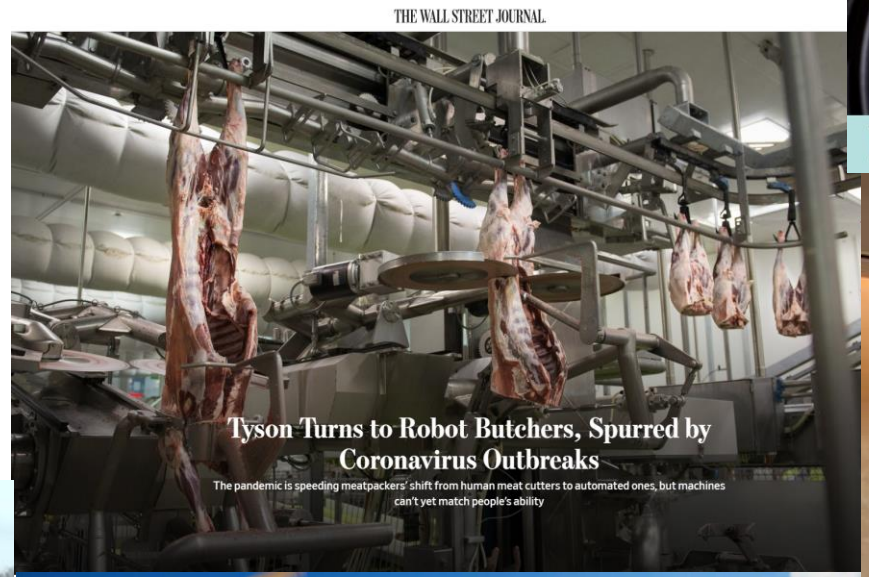


The views expressed here are those of the authors and do not necessarily reflect the views of the Federal Reserve Bank of Philadelphia or the Federal Reserve System.

# Anecdotal Evidence of Automation



- Pennsylvania laid off 500 toll collectors after the interstate system went cashless since COVID-19
- Tyson turns to robot butchers, spurred by coronavirus outbreaks


# Preview of Findings



- Pandemic likely accelerated automation by leading more job losses in automatable occupations, exposing them at an elevated risk of being permanently automated
- The pandemic put more automatable jobs held by minority workers at a higher risk of permanent losses
- Losses of automatable jobs could become permanent, similar to what happened during the recovery from the Great Recession
- Forced automation could create unprecedented need for government interventions to support the jobless and a massive job reallocation

# Potential Channels



## Short-term:

- The pandemic led more job losses in automatable occupations; machinery and software become more attractive than rehiring the displaced workers during the pandemic (e.g., toll collectors, front desk receptionists)
- Constraint on labor supply incentivizes firms to use technology to substitute for workers (e.g., cleaning sanitizing jobs, meatpacking factory workers)
- Recession reduces the adjustment costs associated with automation, leading to a deepening of automation across sectors

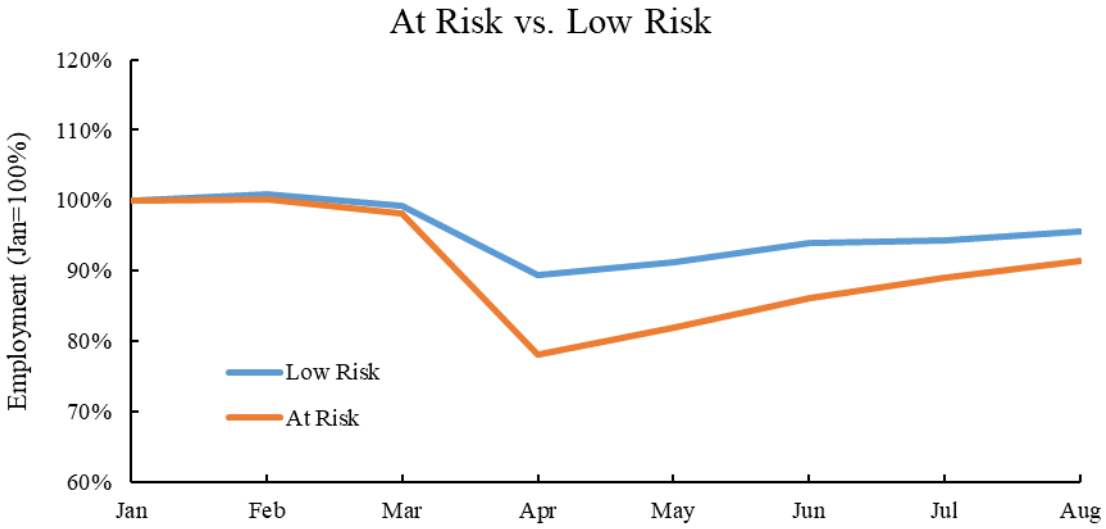
## Long-term:

- Threat of future pandemics and the massive technological transition into the virtual world could induce more automation

# Larger Job Losses in Automatable Occupations



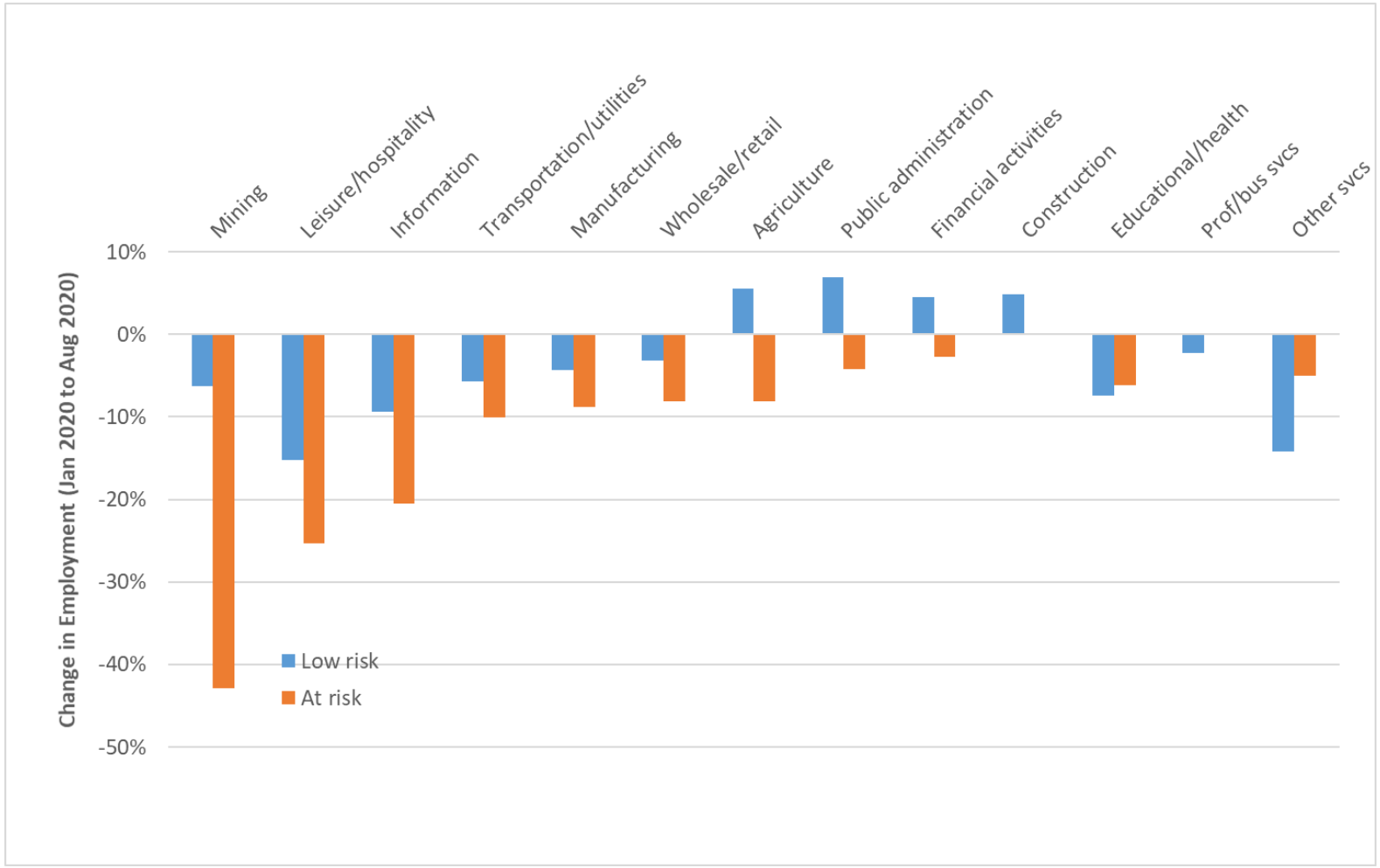
- By August, technically automatable occupations lost 4.2 more jobs per 100 than low risk ones, equivalent to 2.6 million precrisis jobs
- Examples of automatable jobs: hotel desk clerks, shuttle drivers, retail salespersons, parking attendants, toll collectors, waiters and waitresses




Note: "At-risk" or "automatable" jobs: jobs with a 70 percent or greater likelihood of being automated in the next 10–20 years, defined in Frey and Osborne (2017)

# Larger Job Losses in Automatable Occupations





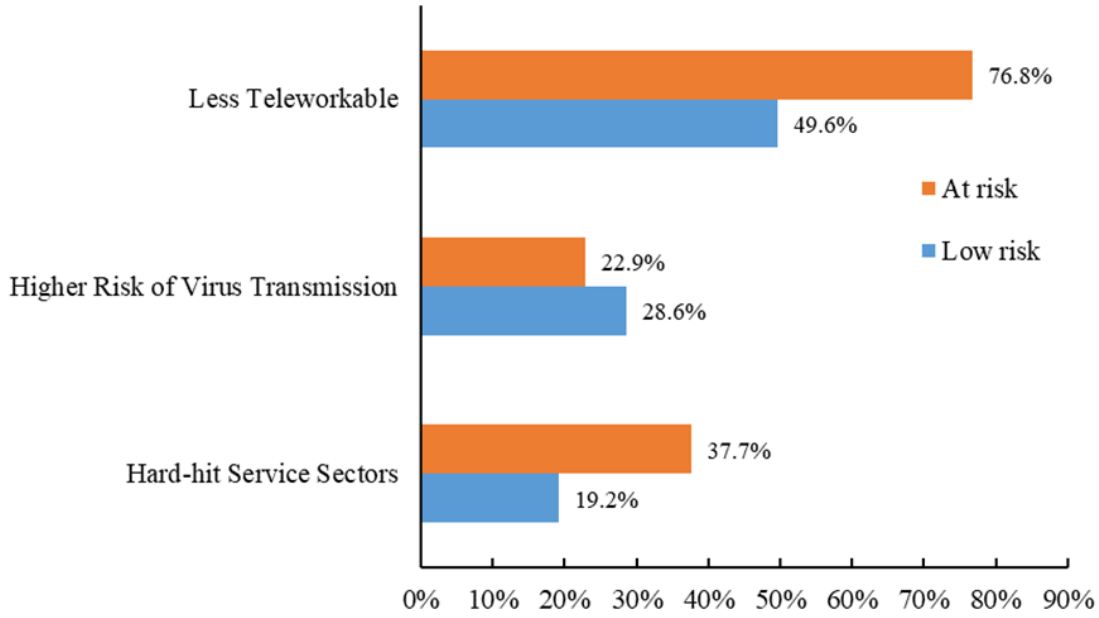

Note: "At-risk" jobs: jobs with a 70 percent or greater likelihood of being automated in the next 10–20 years, defined in Frey and Osborne (2017)

# Larger Job Losses in Automatable Occupations



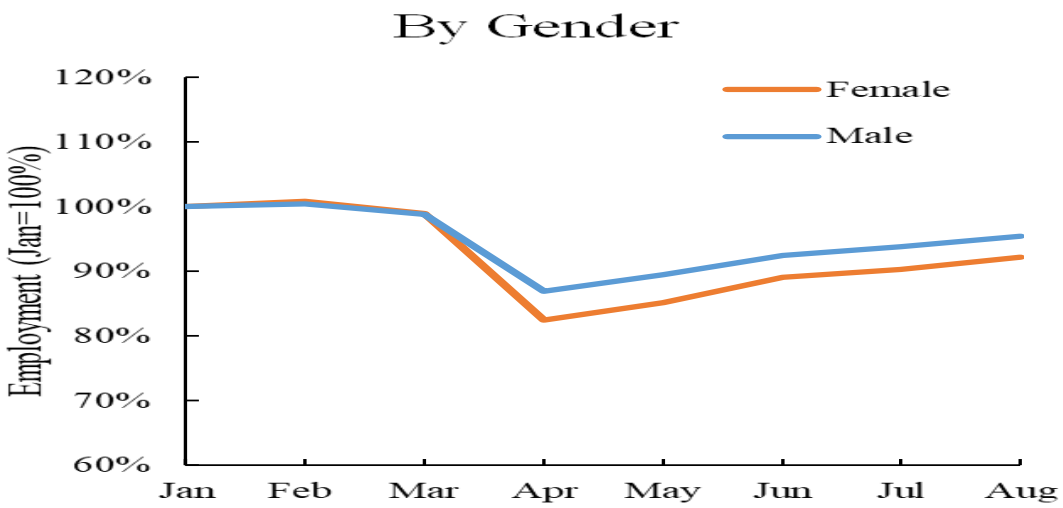
- Automatable jobs are generally
  - Less likely to permit remote work
  - More likely to be in the most affected sectors
- High risk of virus transmission and inability to telework led to larger and more persistent job losses in automatable occupations
  - Example: automatable occupations that do not allow remote work lost 5.7 more jobs per 100 by August than less automatable ones
- Most losses are expected to be temporary but could become permanent because of automation or shift in demand

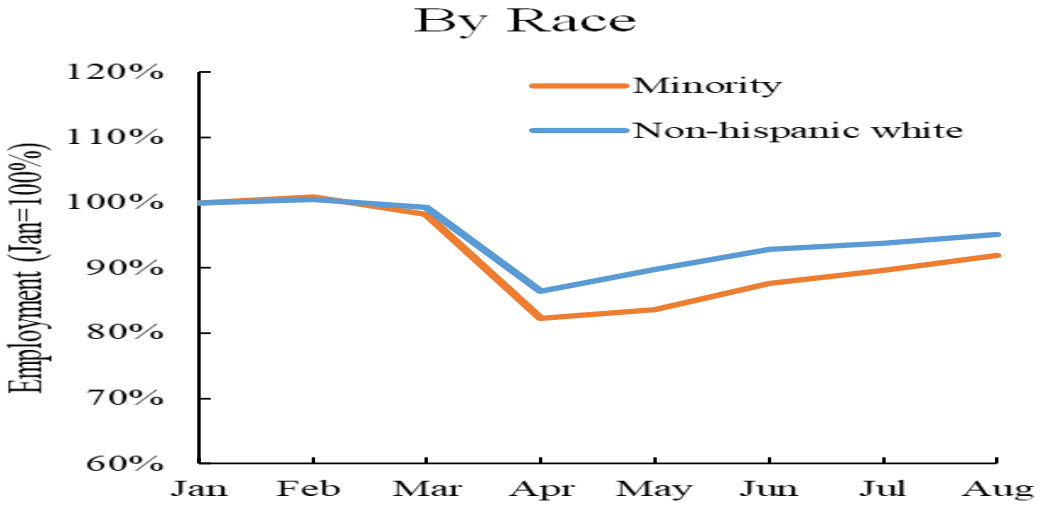
Share of Jobs with High Virus Transmission Risk, Low Teleworkability, or in Hard-Hit Sectors

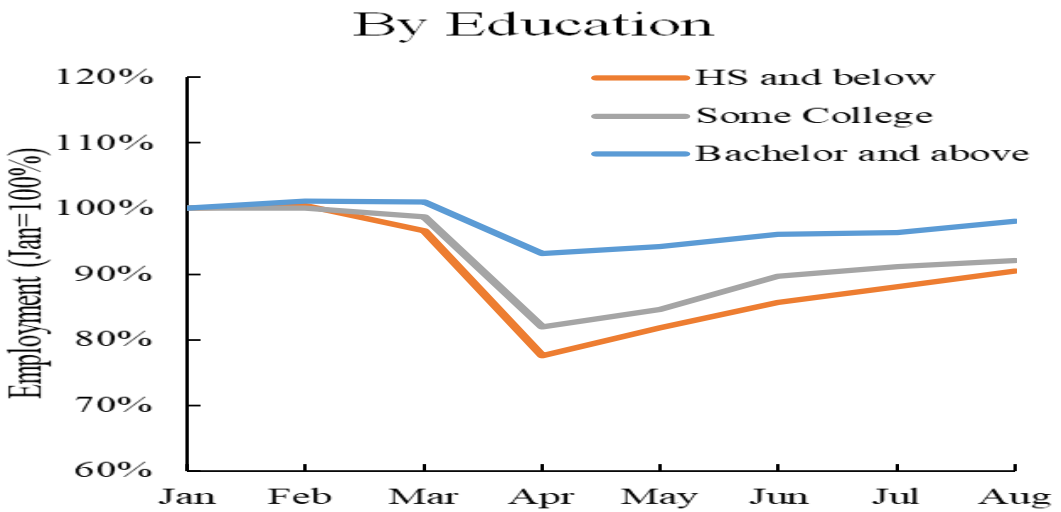


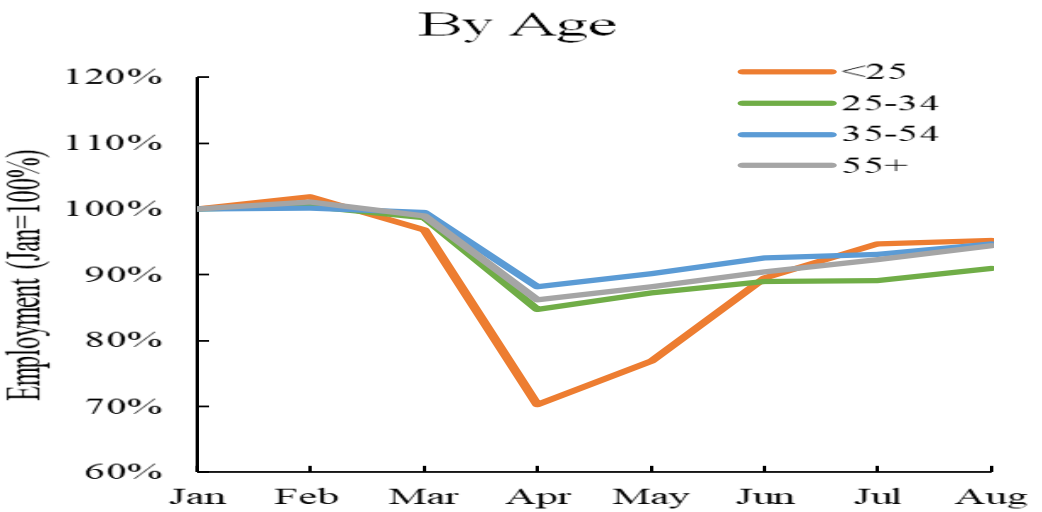
# Experience of Vulnerable Workers

RESEARCH FOR EQUITY IN RECOVERY



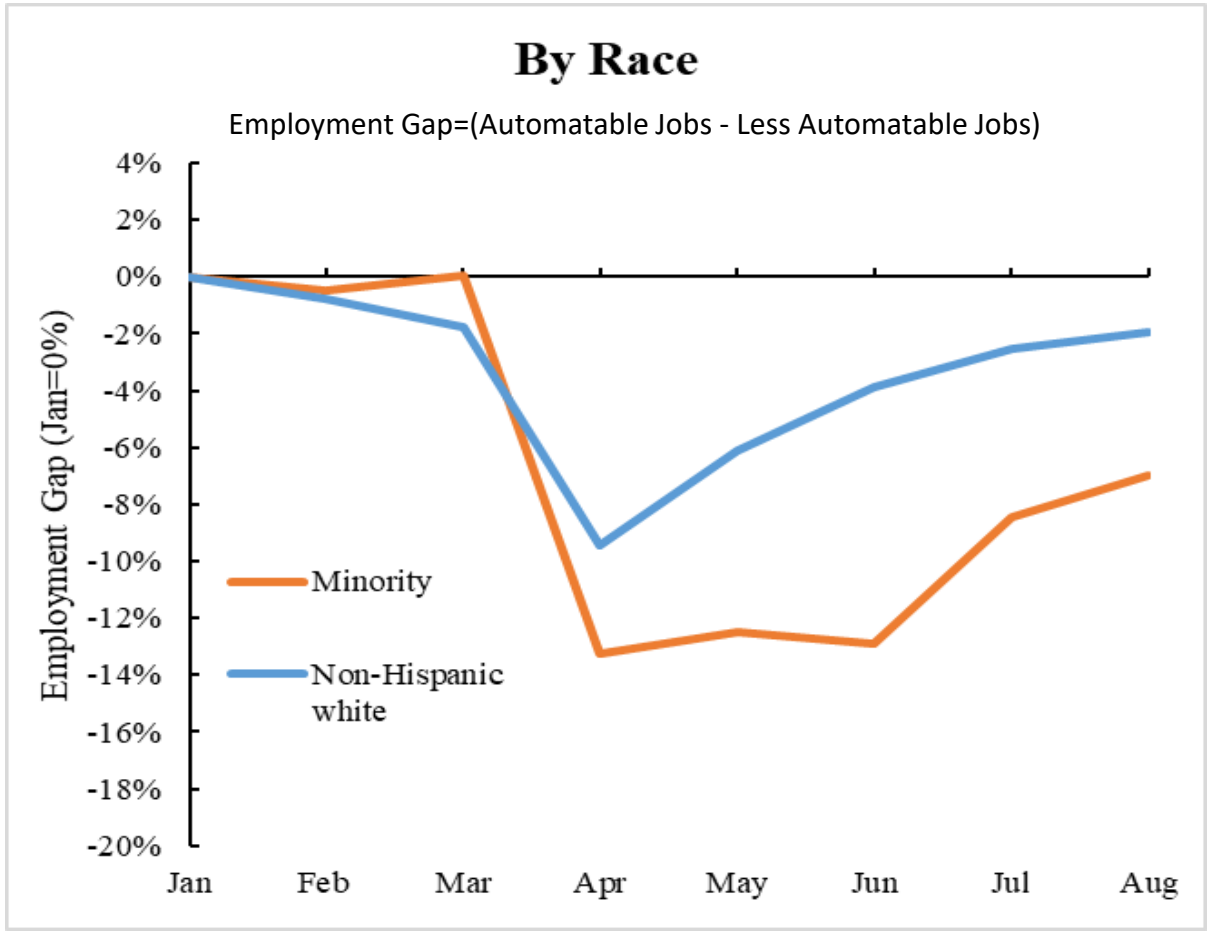




Does COVID Accelerate Automation?

# Experience of Vulnerable Workers



- The pandemic put more minorities at an elevated risk of automation (minority workers lost 7 more jobs in technically automatable occupations; non-Hispanic whites lost 1.9 more only)
- The pattern for other vulnerable populations is still unclear

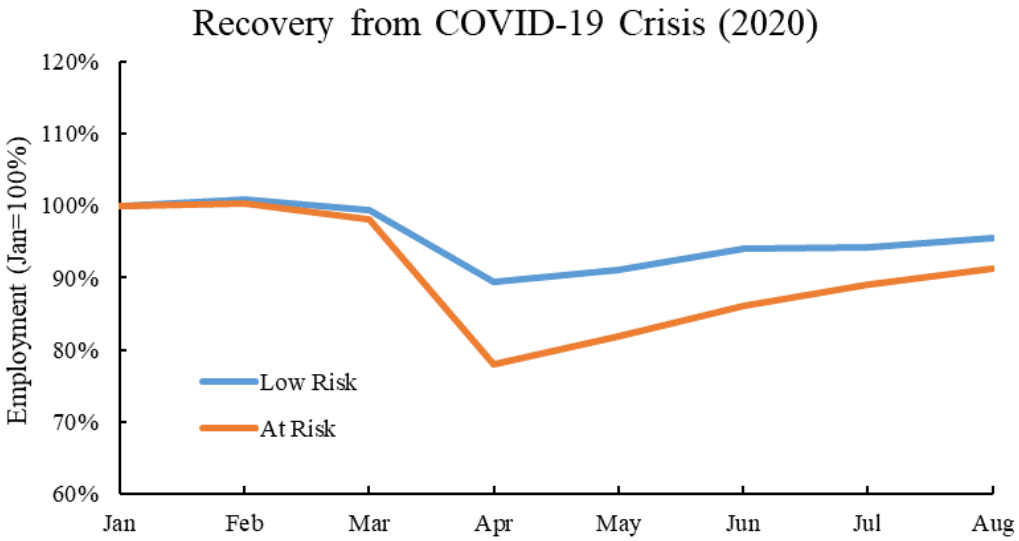


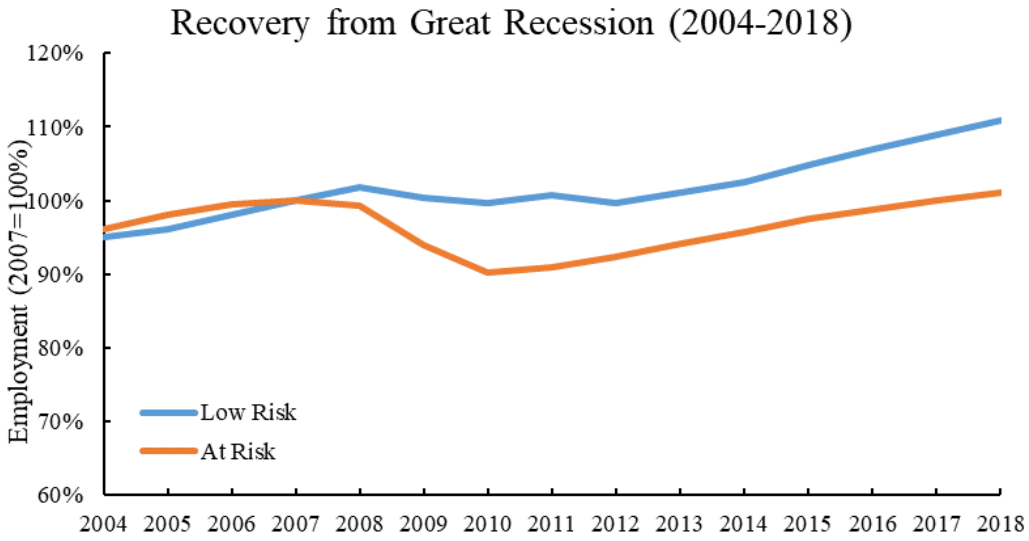

Does COVID Accelerate Automation?

# Lessons from the Great Recession



- Almost all job losses in automatable occupations during Great Recession became permanent (e.g., Autor, 2010; Hershbein and Kahn, 2018; Jaimovich and Siu, 2018)
- The nature and duration of COVID-19 crisis are different, but losses of automatable jobs could become permanent if it evolves into a prolonged economic crisis




Note: "At-risk" jobs: jobs with a 70 percent or greater likelihood of being automated in the next 10-20 years defined in Frey and Osborne (2017)

Does COVID Accelerate Automation?

# Summary of Findings



- Pandemic likely accelerated automation by leading more job losses in automatable occupations, exposing them at an elevated risk of being permanently automated
- The pandemic put more automatable jobs held by minority workers at a higher risk of permanent losses
- Losses of automatable jobs could become permanent, similar to what happened during the recovery from the Great Recession
- Forced automation could create unprecedented need for government interventions to support the jobless and a massive job reallocation

# The Full Report



See Ding, L., and J. Saenz Molina. 2020. *"Forced Automation" by COVID-19? Early Trends from Current Population Survey Data*. Federal Reserve Bank of Philadelphia, Community Development and Regional Outreach, Discussion Paper

RESEARCH FOR
EQUITY IN RECOVERY

# How to Create a Future-Proof Region

Anne Gemmell

Future Works Strategy
September 17, 2020

Does COVID Accelerate Automation?

# Future-Proofing Is Hard

RESEARCH FOR EQUITY IN RECOVERY

Does COVID Accelerate Automation?

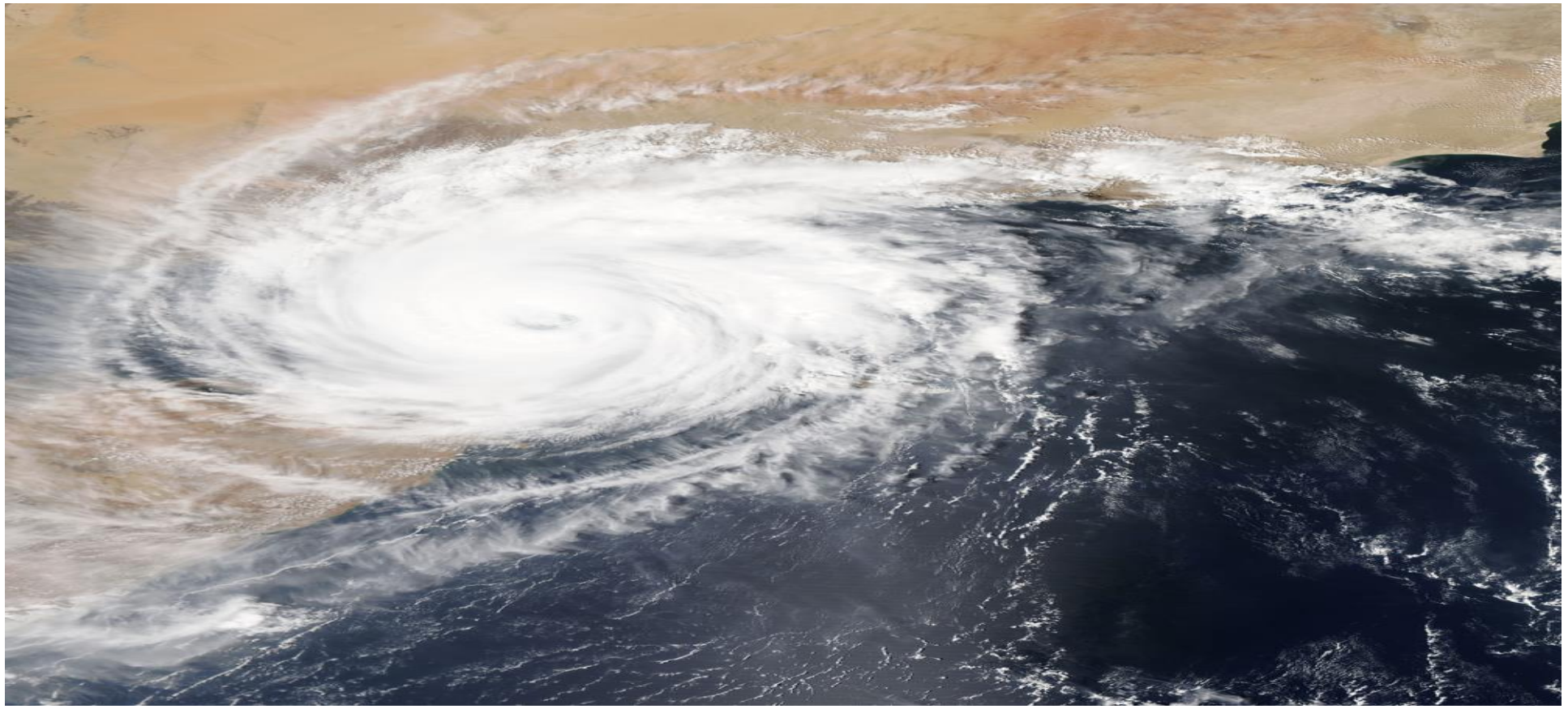
# Future-Proofing Is Hard

RESEARCH FOR
EQUITY IN RECOVERY

Does COVID Accelerate Automation?

# Prediction Is Nearly Impossible

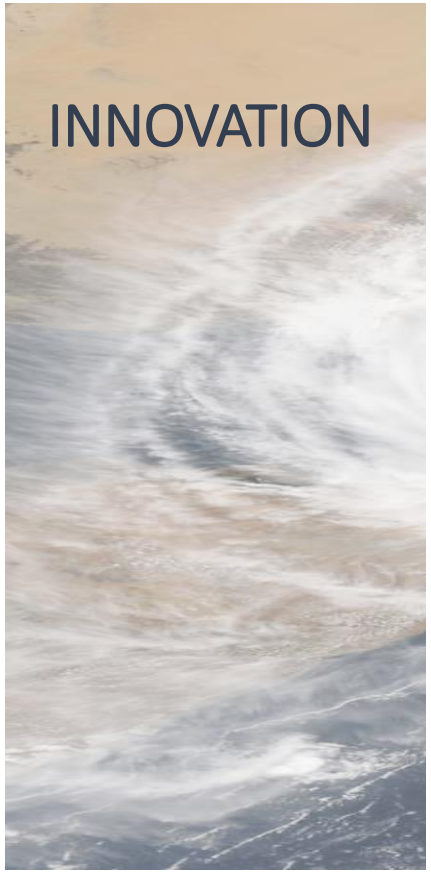
RESEARCH FOR
EQUITY IN RECOVERY

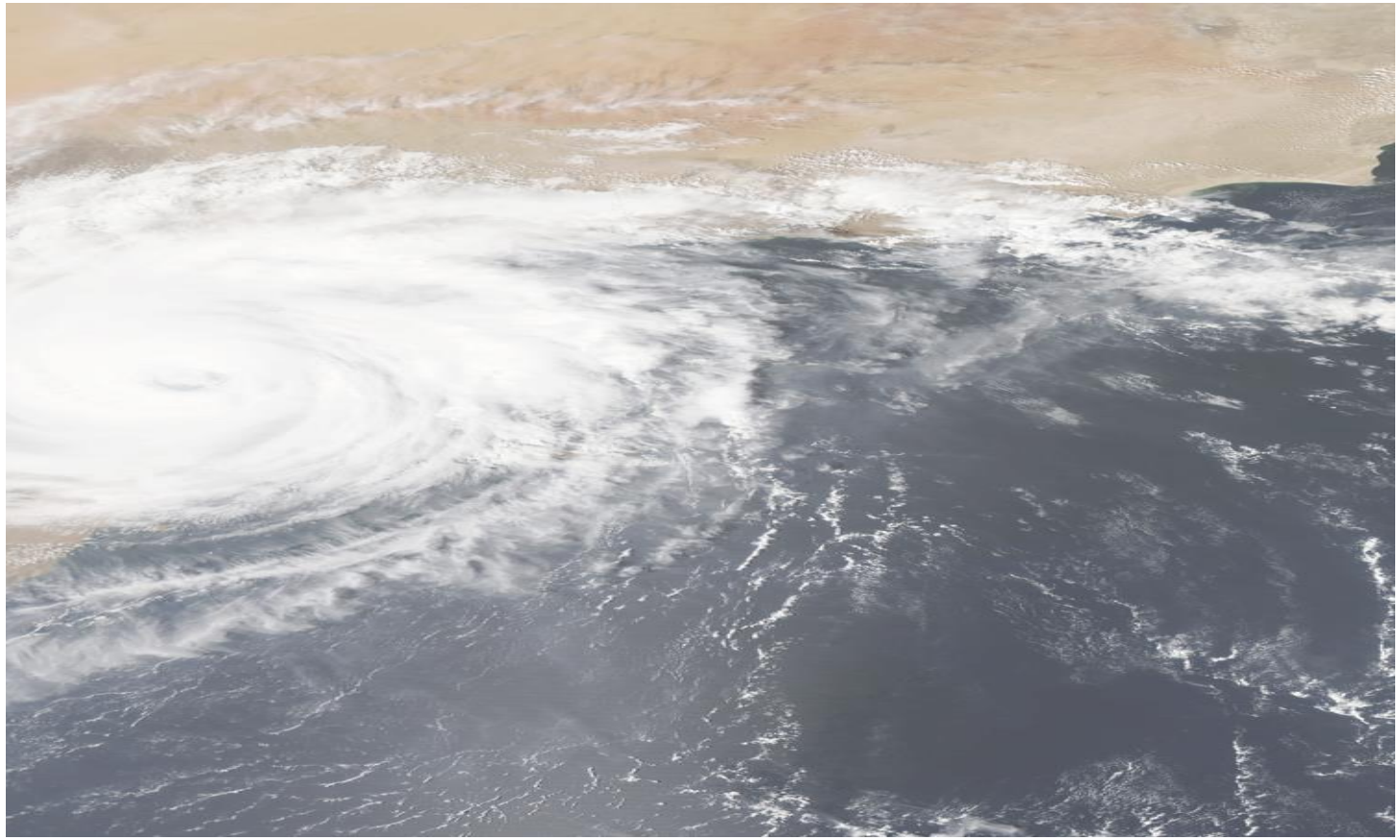


Does COVID Accelerate Automation?

# Future-Proofing Pillars

RESEARCH FOR
EQUITY IN RECOVERY

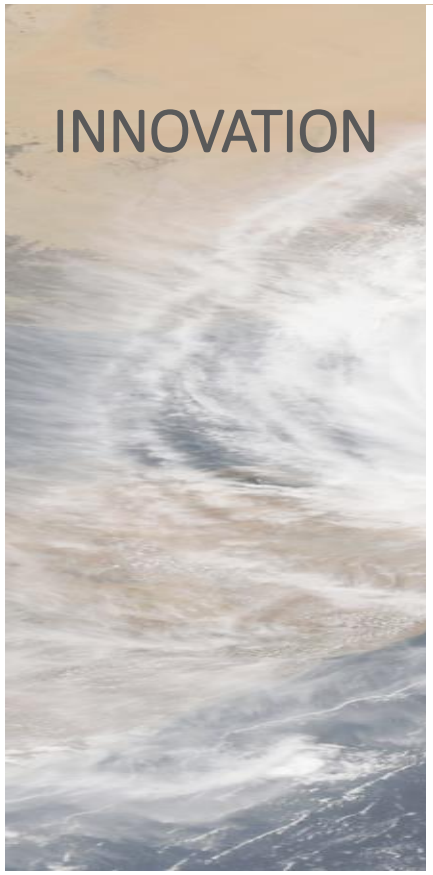


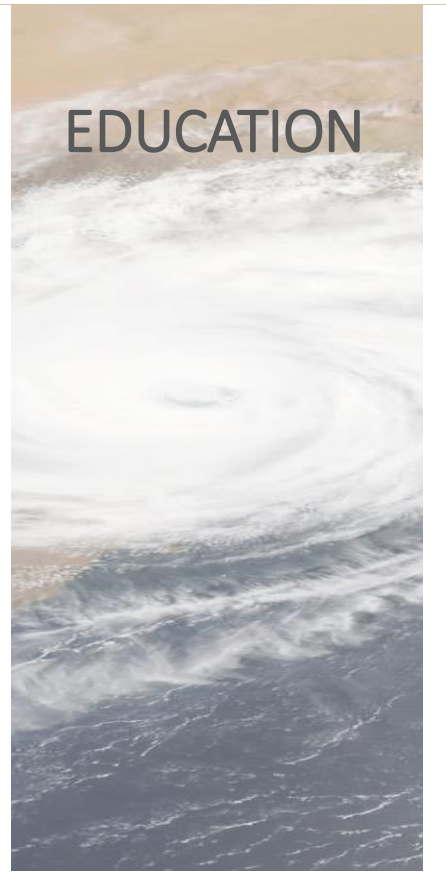



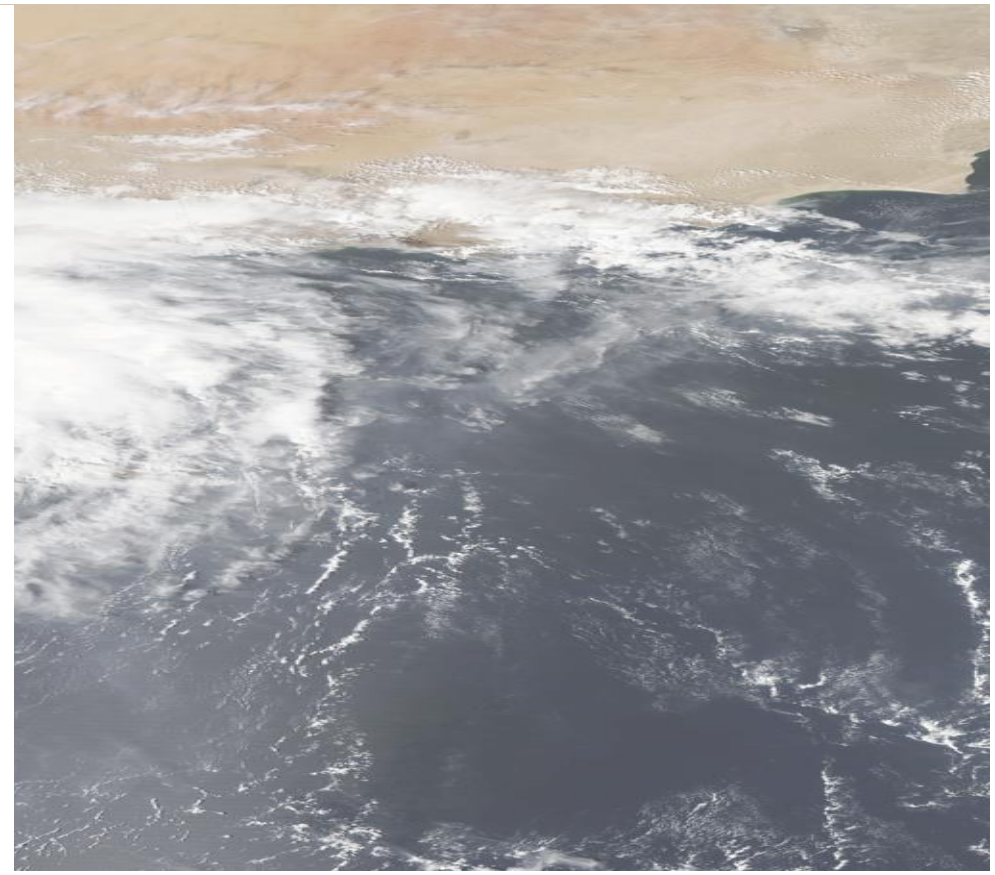
Does COVID Accelerate Automation?

# Future-Proofing Pillars

RESEARCH FOR
EQUITY IN RECOVERY



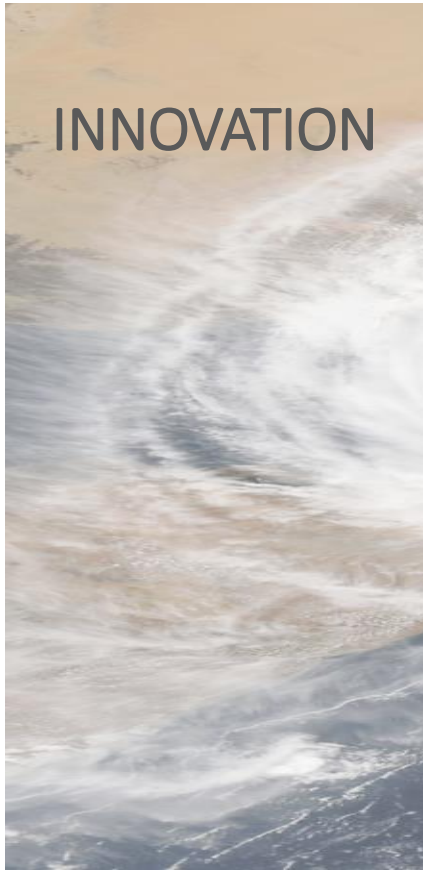



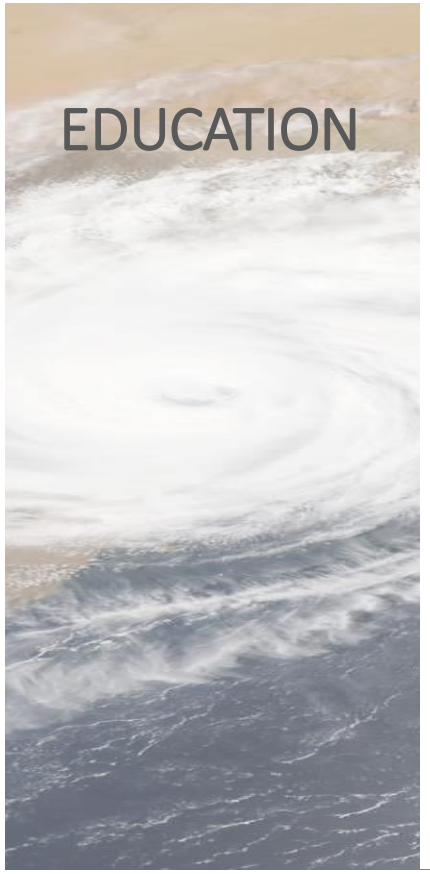



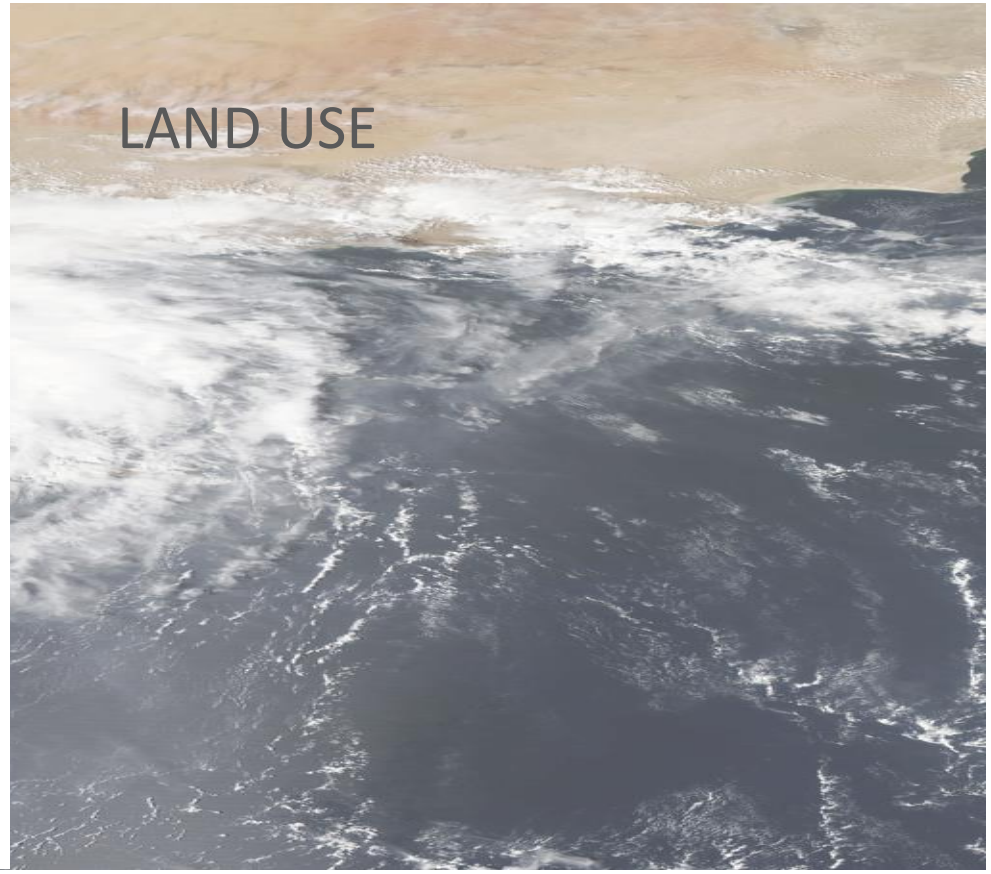
Does COVID Accelerate Automation?

# Future-Proofing Pillars

RESEARCH FOR
EQUITY IN RECOVERY



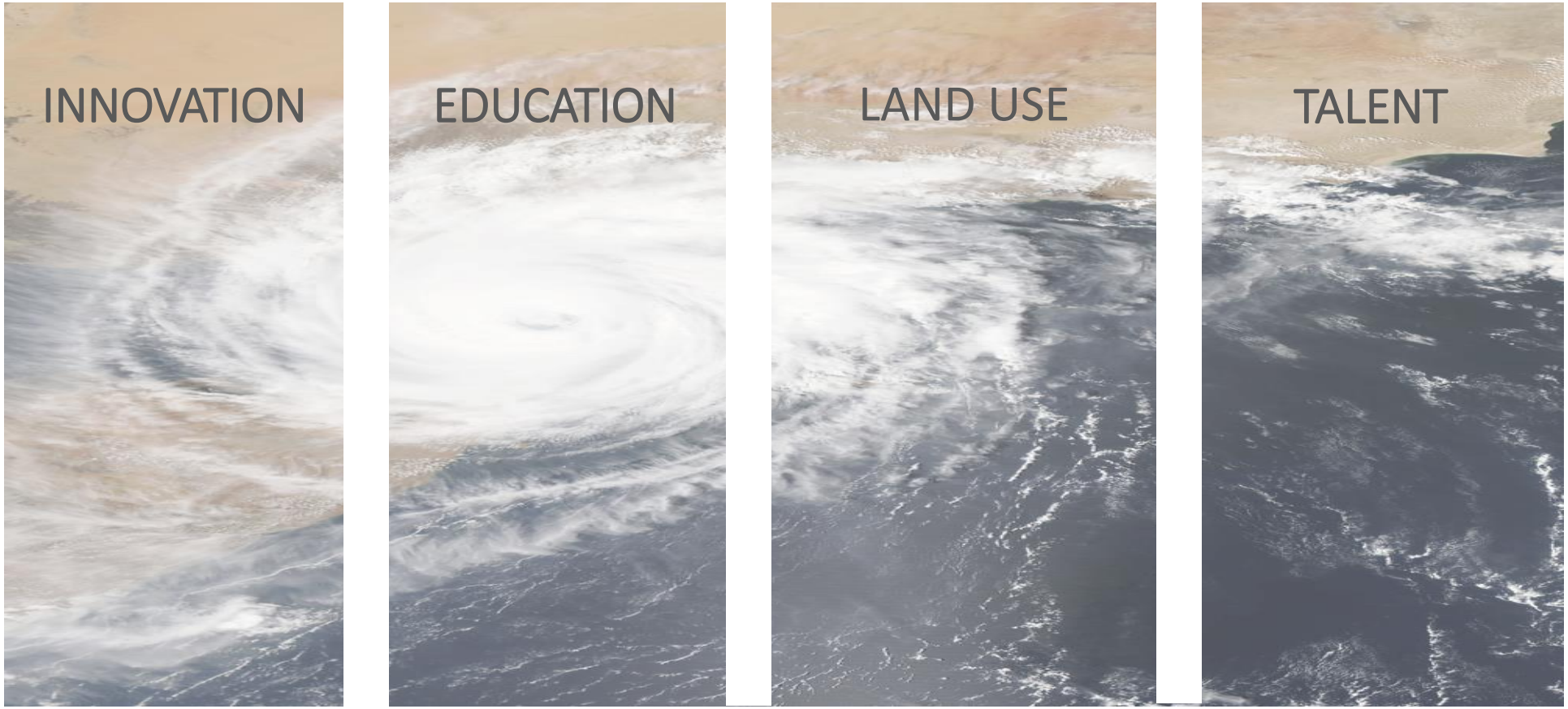




Does COVID Accelerate Automation?

# Future-Proofing Pillars

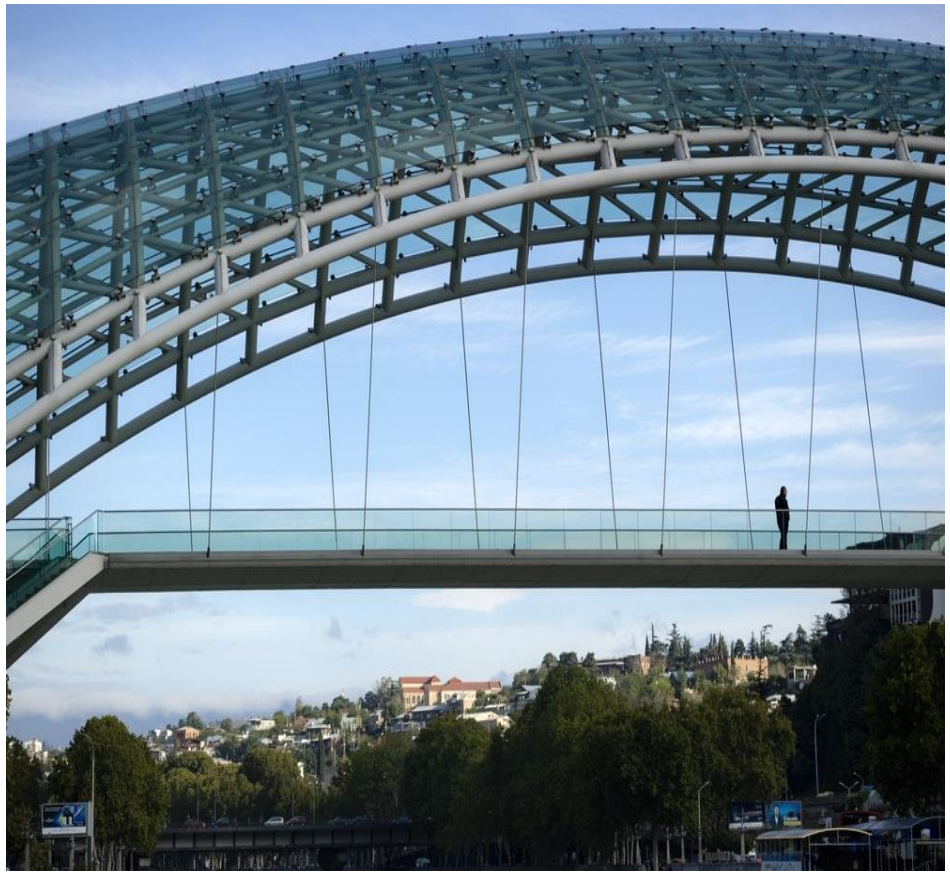
RESEARCH FOR
EQUITY IN RECOVERY




Does COVID Accelerate Automation?

# Future Works Alliance
## COMING SOON: www.futureworksPHL.com

RESEARCH FOR
EQUITY IN RECOVERY

Does COVID Accelerate Automation?

# Thank You!