




Impacts on the U.S. Economy of the COVID-19 Pandemic

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Aim

- Economic impacts of the coronavirus for USA, China and ROW over time
- Built up using a comprehensive list of causal factors and actual data for 2020
- Initially done in comparative static model (Walmsley, Rose and Wei, 2020 and 2021), adapted and updated for Dynamic model

2

Model and Data

- **Model**
 - Global general equilibrium model based on GTAP
 - Extra features
 - supply chains,
 - unemployment (gradually reduces at the rate of 50% each 6-months, provided wages are rising – if not unemployment rises further)
 - additional preference variables and other taxes for tracking closures, avoidance etc
- **Database**
 - 141 countries aggregated to USA, China and ROW
 - 65 goods and services (or sectors)
- **Baseline**
 - Updated to 2020 (annual), simulations 2020 to 2023 (semi-annual)
 - Baseline includes pre-COVID forecasts of some basic macroeconomic variables: GDP growth, population, labor force, and investment

3

Model and Simulations

- **COVID Scenario decomposed by causal factors**
 - mandatory closures and gradual re-opening process
 - decline in workforce
 - avoidance behavior
 - increased demand for health care
 - fiscal policy
 - pent-up demand
 - other resilience (investment, communication etc)

4

Mandatory closures

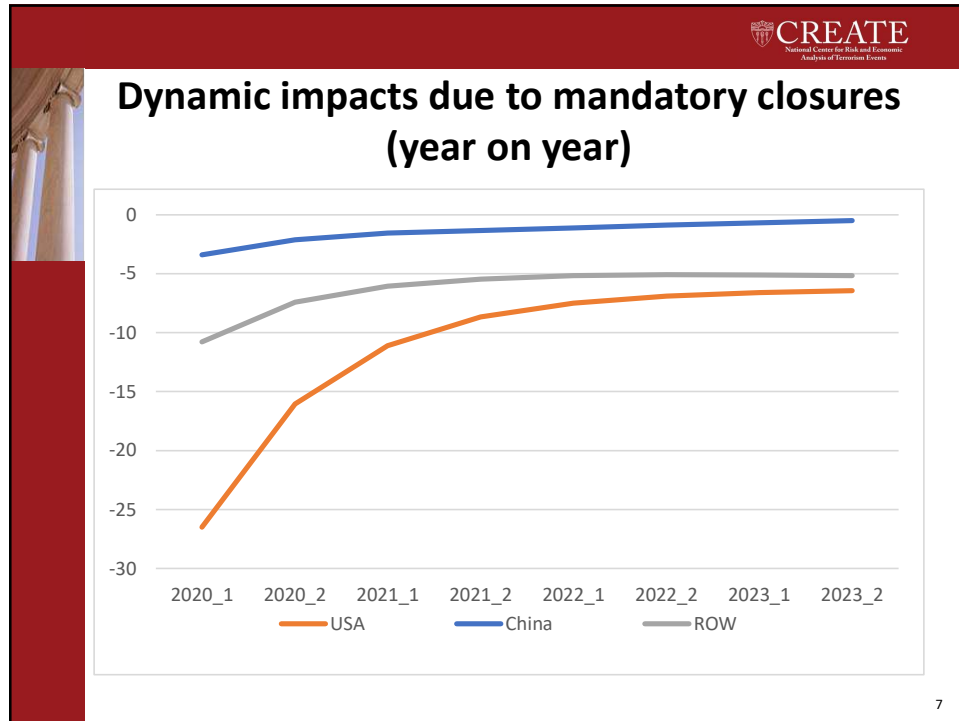
- USA:
 - Mandatory closures & re-openings (sources: “stay-at-home” orders by state; reopening schedules by major states, NYT; essential sectors, DHS CISA)
 - Telework by sector by month (current source: recent BLS Current Population Survey)
 - Non-essential defined in terms of US definitions of non-essentials (Non-critical Mfg, Recreation & Entertainment, Education and parts of Retail Trade, Food Services, Business Services, etc.)
- China and ROW
 - Mandatory closures & re-openings (sources: Wikipedia. Days closed by country, essential sectors based on USA data)
 - Telework by sector (source: US data)
 - ROW adjusted for actual data for 2020 (macro from IMF and OECD)
 - Based on GDP changes the ROW did not close down to the same extent as USA
 - Based on days of closure and deaths in 2021_1 – we assume ROW lags USA by 6 months

5

Mandatory closures

- Modeling
 - Use taxes rather than productivity to track mandatory closures
 - Additional reductions in trade in services due to reduced movement of labor
 - Taxes gradually removed over time depending on reopening and mandatory closures in later part of 2020 and 2021
 - Adjustments made to savings: when consumers consume less (mandatory closures or avoidance) household savings was increased
 - Assume private demand for essentials, private and govt demand for health, and government expenditure are fixed

6



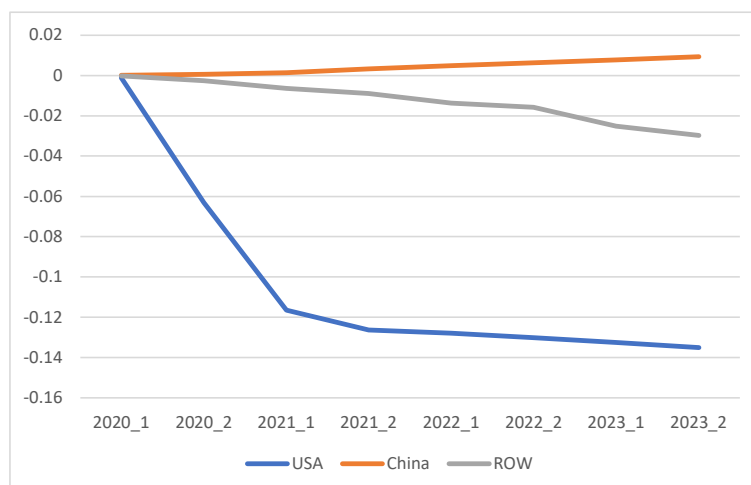
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Decline in workforce

- Due to deaths and illness
- USA
 - COVID-19 health outcomes and impacts on labor force (main sources: CDC & expert interviews)
 - Assume no skill bias in deaths or illness due to COVID
- ROW and China
 - COVID-19 health outcomes and impacts on labor force (source: Ritchie, et al <https://ourworldindata.org/coronavirus>)

8

Dynamic impacts due to reductions in labor force: deaths and illness



9

Avoidance

- USA
 - Based on survey
- ROW and China
 - Based on USA, adjusted for length of pandemic
- Not incorporated into analysis yet
- Survey of Avoidance Behavior
 - Sample recruited using Prolific <https://www.prolific.co/>
 - Representative sample of US adults by sex, age, & race/ethnicity
 - N=1600
 - Fifteen minute survey of current avoidance behavior and expected avoidance behavior six months later

10

Ten Avoidance Behavior Domains

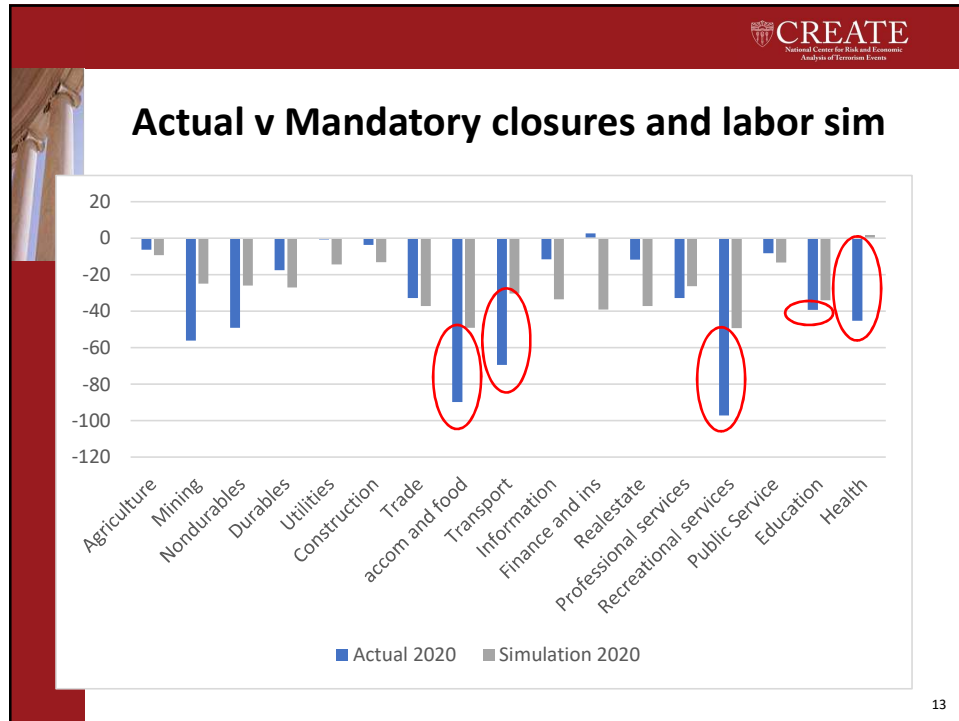
1. Staying home from work
2. Keeping children home from school
3. Canceling or postponing medical and dental appointments
4. Canceling or postponing domestic and international travel
5. Canceling or postponing personal grooming and spa treatments
6. Avoiding in-person shopping
7. Avoiding local leisure activities, e.g., dining out, bars
8. Avoiding recreational activities, e.g., golf, tennis, swimming
9. Avoiding large crowds, e.g., sports events, concerts, shows
10. Avoiding public transportation

11

Avoidance Behavior Summary of Findings Comparing Pre-Pandemic to 10/2020-4/2021

- Travel & Transportation decreased 60-90% depending on mode
- Routine Medical Appointments: Average of over 6 medical appointments of various types per person cancelled over 6 months of pandemic
- Dining decreased 60-80% depending on type; take-out & drive-thru dining increased 37%
- In store shopping decreased 43-61% depending on type; Online shopping increased 44-54% depending on type
- Indoor recreational activities decreased by 66%
- Attendance at large events decreased by 74-89% depending on type

12



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Health care

- Insufficient data to separate suspension of health care and avoidance
- Avoidance taken from survey - evidence suggest avoidance is very high
- Then match health care sector production in 2020 to capture if suspension > avoidance

14

Increased health expenditure

- USA
 - COVID-19 health outcomes and impacts on labor force (main sources: CDC & expert interviews)
 - COVID-19 health care expenditures (main sources: CDC & expert interviews)
- ROW
 - COVID-19 health outcomes and impacts on labor force (source: Ritchie, et al <https://ourworldindata.org/coronavirus>)
 - COVID-19 health care expenditures (sources: based on US sources, but scaled)

15

Pent up demand

- USA
 - Pent-up demand (sources: economic tracker, Opportunity Insights; foot traffic data, SafeGraph and Unacast)
- ROW and China
 - Pent-up demand (based on US data) adjusted for length of pandemic
- Modeling
 - Increased demand and reduced savings as people increase demand for things missed while in lock-down

16

Prior Comparative Static Results

Country/ Region	Mandatory Closure & Reopening	Avoidance	Communi- cation Demand	Deaths and Illness	Health Care Expenditure	Pent-up Demand	Total Impacts
USA	-8,040.1 (-37.5)	-853.2 (-4.0)	263.2 (1.2)	-23.7 (-0.1)	966.3 (4.5)	3,821.1 (17.8)	-3,866.5 (-18.0)
China	-2,392.3 (-16.9)	-758.8 (-5.4)	174.1 (1.2)	0.2 (0.0)	531.4 (3.8)	1,434.4 (10.1)	-1,010.9 (-7.1)
ROW	-13,943.1 (-26.6)	-3,282.2 (-6.3)	1,395.4 (2.7)	3.5 (0.0)	1,613.2 (3.1)	7,852.4 (15.0)	-6,360.8 (-12.1)

17

Fiscal stimulus (sources: CBO, GAO, CRS)

Round	Bill Name	Date Signed into Law	Total Spending (billions USD)
1	H.R.6074 - Coronavirus Preparedness and Response Supplemental Appropriations Act, 2020	3/6/2020	8.06
2	H.R.6201 - Families First Coronavirus Response Act	3/18/2020	192.02
3	H.R.748 - CARES Act	3/27/2020	1901.96
4	H.R.266 - Paycheck Protection Program and Health Care Enhancement Act	4/24/2020	342.26
5	H.R.133 - Consolidated Appropriations Act, 2021	12/27/2020	864.34
6	H.R. 1319, American Rescue Plan Act of 2021	3/11/2021	1825.07

18

US fiscal policy (rounds 1-4)

Real GDP (% differences)

Unemployment benefits	0.7
Cash payments and other household assistance	1
PPP loans, govt spending and corporate tax	5
Corporate tax changes	2.3
total	9

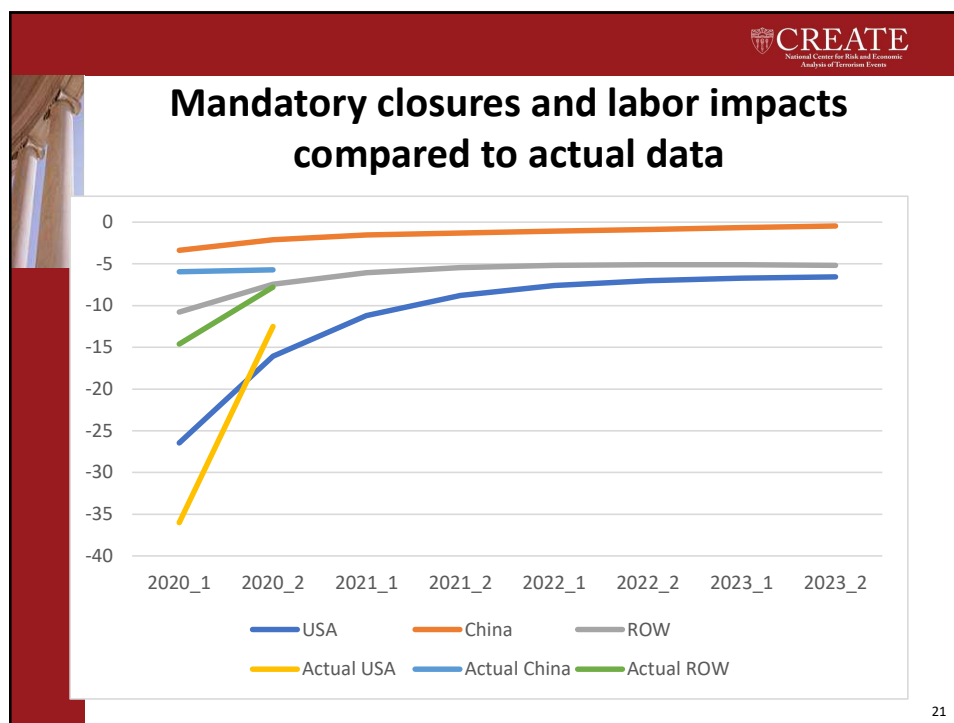
- Preliminary simulations done in comparative statics
 - Savings is used to fund (lowering GTAP savings rate)
 - Implemented using government or public service spending, subsidies to labor and capital and transfers to households
 - Savings rates on cash payments assumed to be higher than on unemployment benefits

19

Other factors

- Compare results so far (closures and workforce) to actual data in 2020
 - USA: macro, and employment and production by sector BEA
 - China and ROW: IMF and OECD

20



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Potential Reasons for Differences in Output

- Still to be done
 - Avoidance still to be included. Expected to further reduce:
 - Accommodation and food
 - Recreational services
 - Transport
 - Health
 - Education
 - Pent-up demand and fiscal policy
- Information/Communication services
- Investment – much higher than models suggest

22

Unemployment

- Actual Unemployment rate in first half of 2020 rose to 15%.
- In our model the unemployment rate rose to 25%
- Possible reasons that have not been included yet
 - Avoidance of work
 - Fiscal policy (rounds 1-4 in 2020) aimed at keeping people in employment

23

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24