

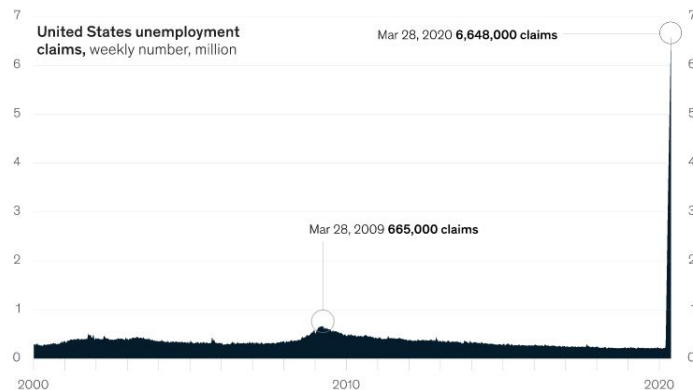
Modeling and Simulation of the Impact of COVID-19 on Employment in the US

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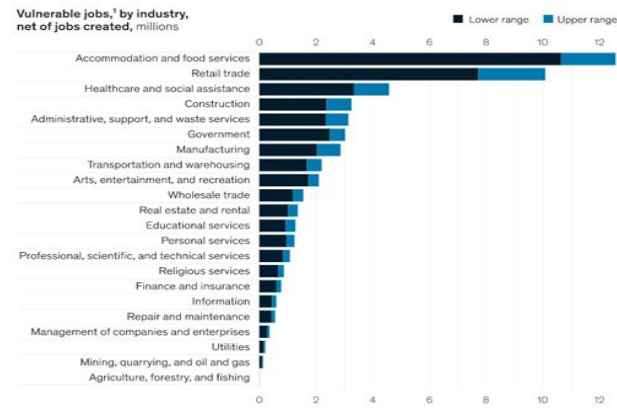
Problem Statement

- The goal of the process was to model the impact of measures taken to tackle the COVID-19 pandemic.
- The lockdown enforced by the policy maker has disrupted the lives of many and we tried to model its effect on economy.
- The problem of the study was to determine if the lockdown restrictions might affect employment of the Class of 2020.

Weekly initial unemployment claims in the United States reached an all-time high of 6.6 million for the week of March 21–28.

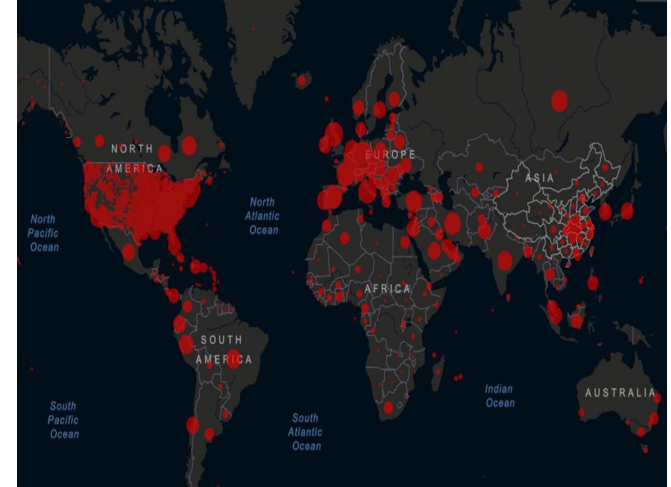


Forty-four million to 57 million jobs are vulnerable in the short term, offset slightly by two to three million new jobs.



Problem Overview

- COVID-19
 - Caused by severe acute respiratory syndrome coronavirus (SARS-2)
 - Novel, very contagious, no vaccine
 - Identified in Wuhan, China in December 2019
 - Over 4 million cases globally
 - Spread to US in January
 - As of May 4, US has most confirmed cases in world, including the most death rate



Problem Overview

- Tackling the pandemic
 - Novel virus
 - Higher rate of infectivity than rate of recovery
 - Need to limit contact to stop the spread
 - Avoid places with high concentration of people
 - Urgent need to restrict public movement and impose lockdown which will cause a severe blow to the economy

Transit stations

-35%

compared to baseline



Mobility trends for places like public transport hubs such as subway, bus, and train stations.

Workplaces

-29%

compared to baseline



Mobility trends for places of work.

Residential

+10%

compared to baseline



Mobility trends for places of residence.

Retail & recreation

-34%

compared to baseline



Mobility trends for places like restaurants, cafes, shopping centers, theme parks, museums, libraries, and movie theaters.

Grocery & pharmacy

-4%

compared to baseline



Mobility trends for places like grocery markets, food warehouses, farmers markets, specialty food shops, drug stores, and pharmacies.

Parks

+28%

compared to baseline



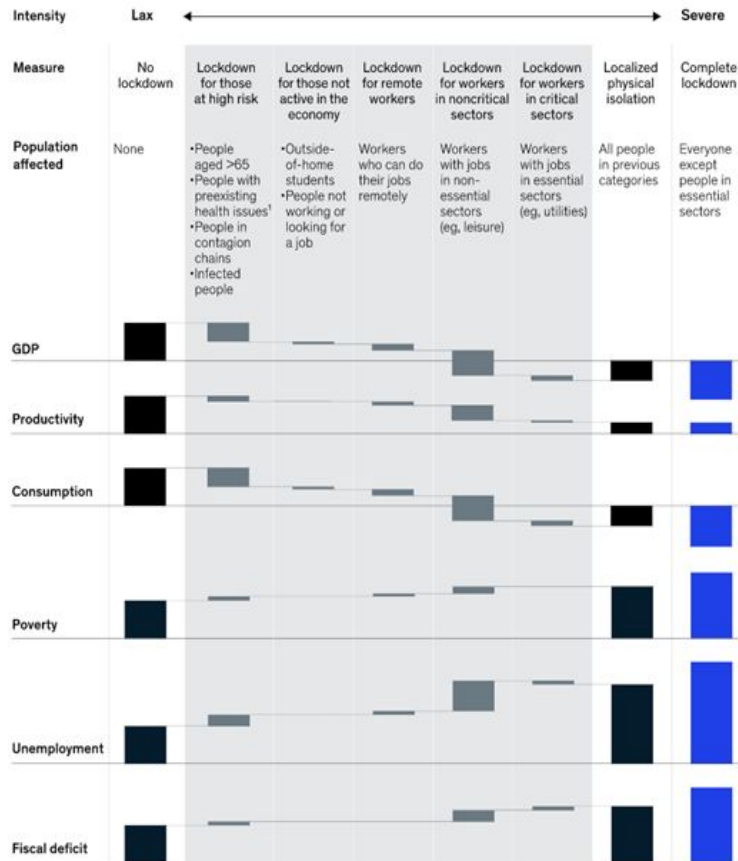
Mobility trends for places like national parks, public beaches, marinas, dog parks, plazas, and public gardens.

Problem Overview

- Lockdown policies nationwide
 - Limited economy to business deemed essential
 - Reduced contact rate, but increase in unemployment
 - Negative impact on the economy
- Graduate class of 2020
 - Entering restricted job market
 - Decrease in on-site employment

The intensity of physical distancing will determine its impact on the economy.

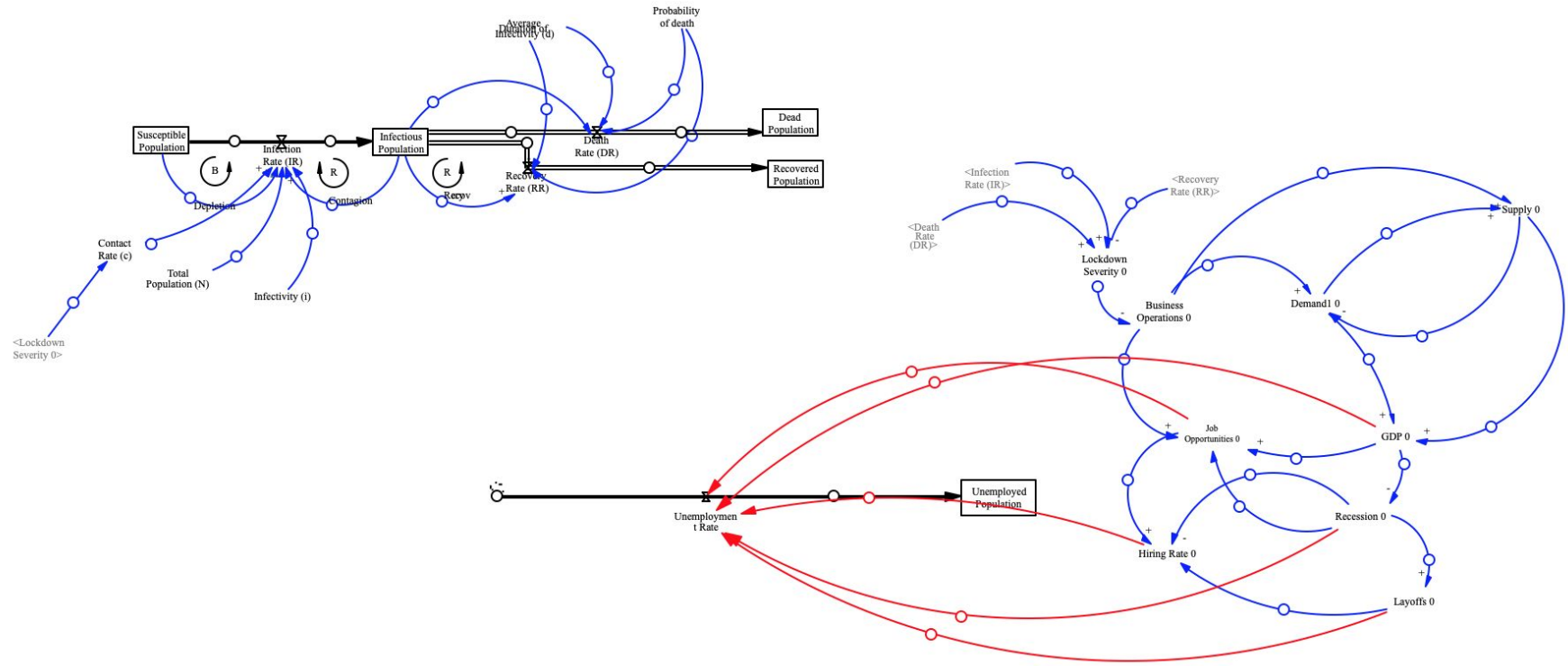
Physical-distancing impact on key indicators for different populations by intensity, % change (illustrative)



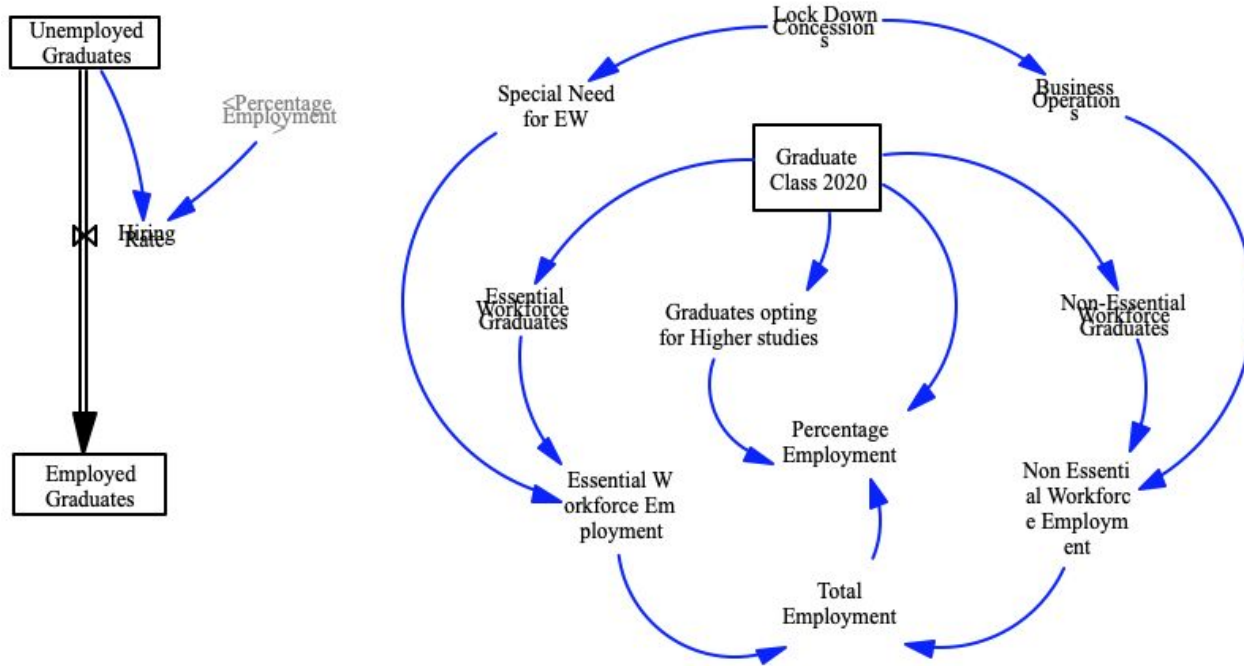
System Definition

- SIR Model
 - Susceptible, Infected, Recovered, Dead
- Influence on public perception and lockdown policy
 - Reduced business operation
 - Reduced supply and demand
 - Available jobs decrease, hiring freezes, layoffs
- Employment
 - Affected adversely by economic results of lockdown
- Graduate Class of 2020 populate the system

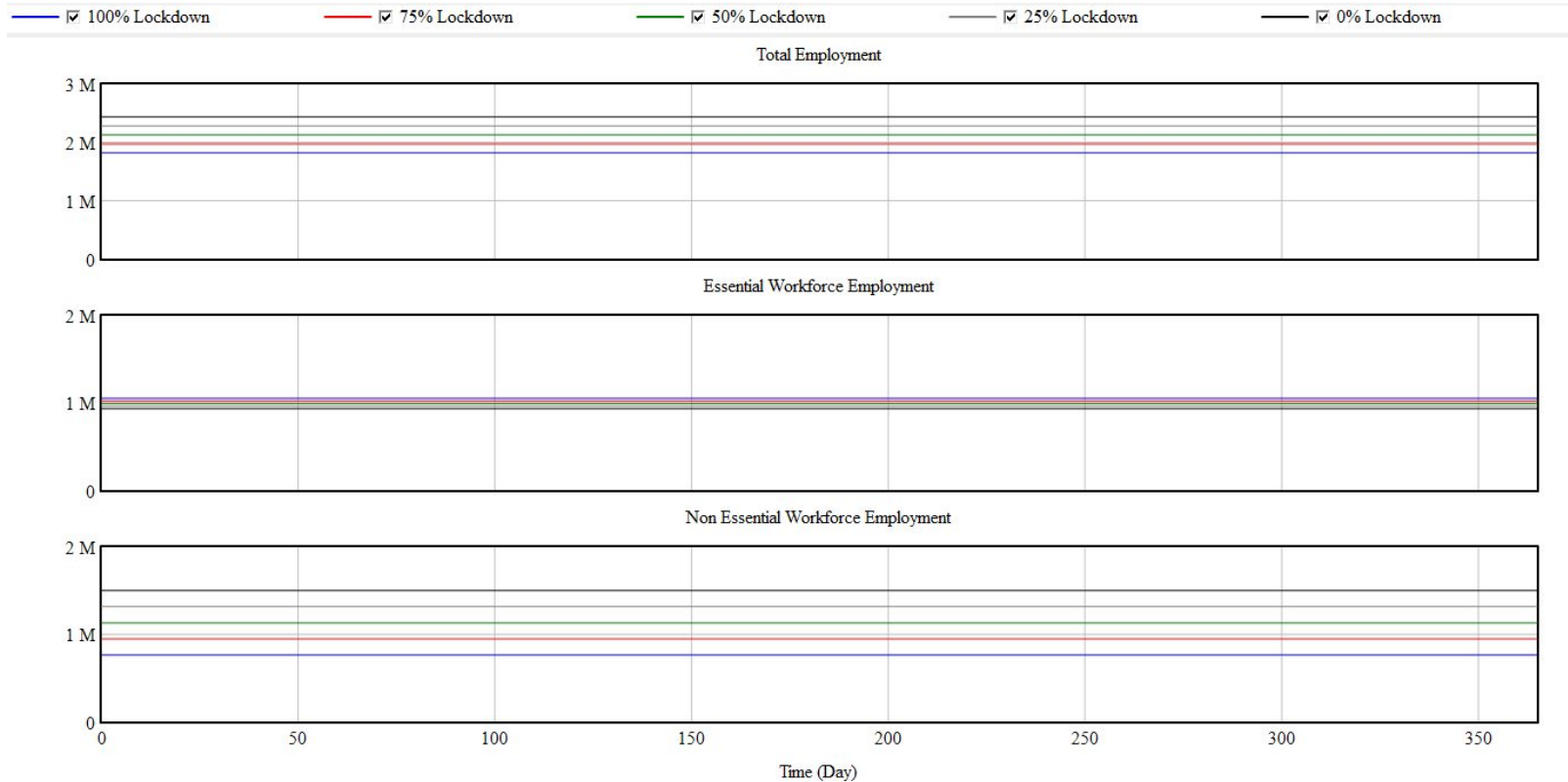
Conceptual Model



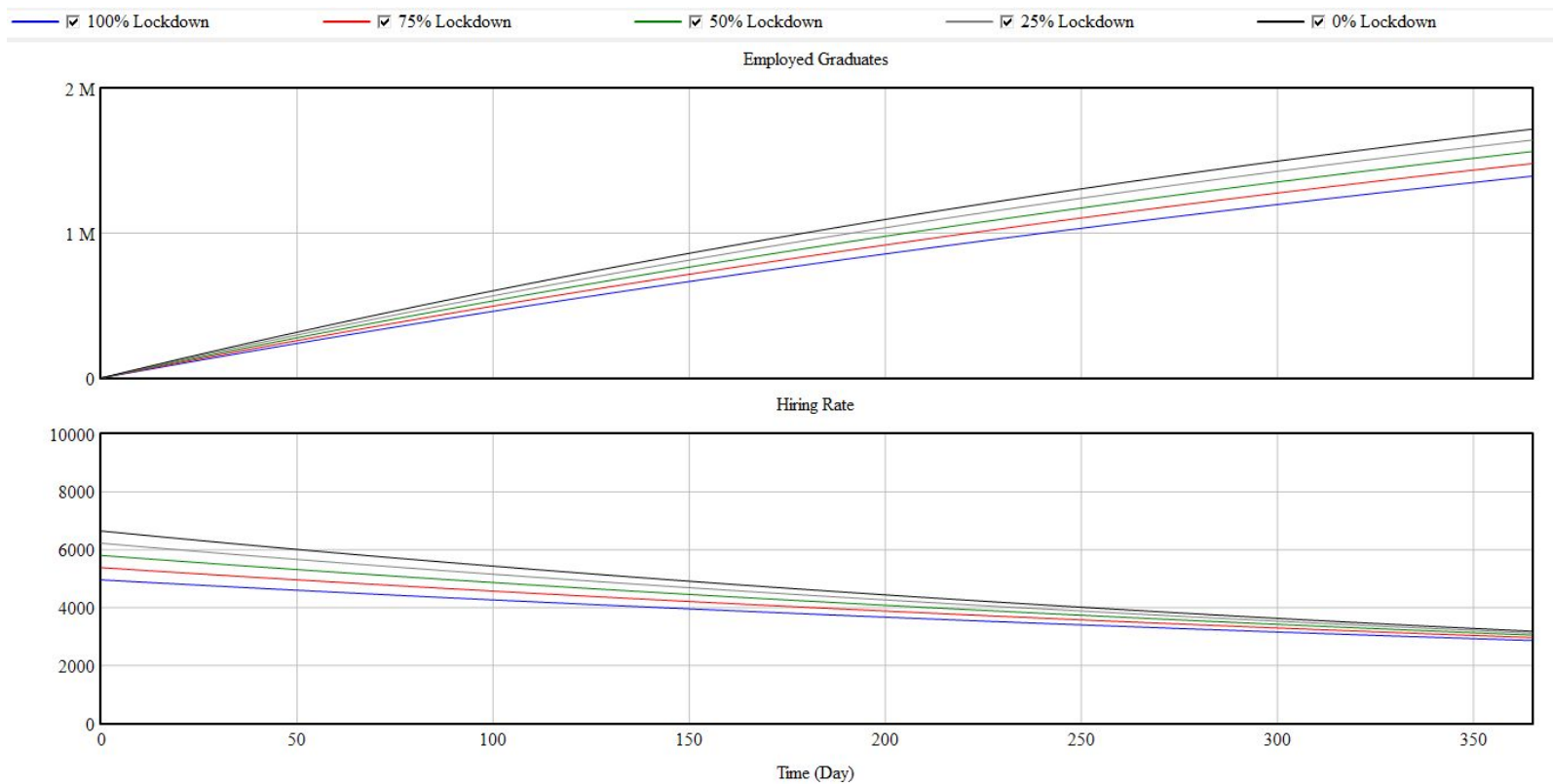
Simulation Model



Simulation Results



Simulation Results



Simulation Results

1. The lockdown imposed is proportional to the infectivity rate, recovery rate and death rate
2. Business operations and available employment is negatively affected by the lockdown rate.
3. Percentage employment for recent graduates decreases with the increase in lockdown.
4. Graduate Class of 2020 will see huge drop in employment in the current lockdown scenario.

Discussion

- Need to find a balance for lockdown
 - More lockdown slows progression of virus, but hurts economy, converse is true
 - What is more harmful to economy?
- Future job market landscape
 - Work from home may be here to stay
 - Reduction of Office spaces
 - Essential Goods manufacturing increase
 - E-commerce Businesses and Online Stores increases