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

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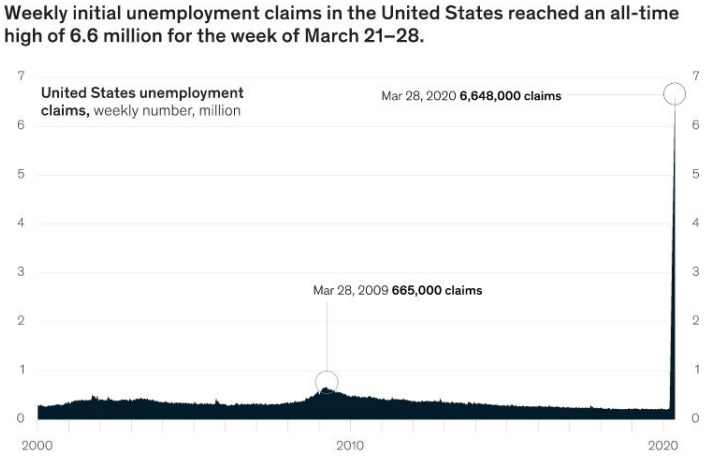
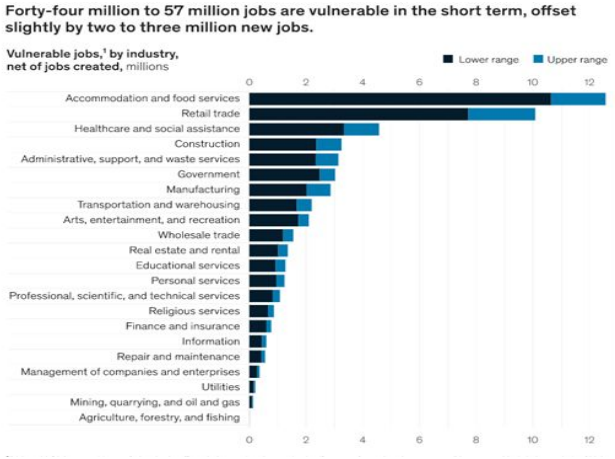
Problem Statement

- 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 makers 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.



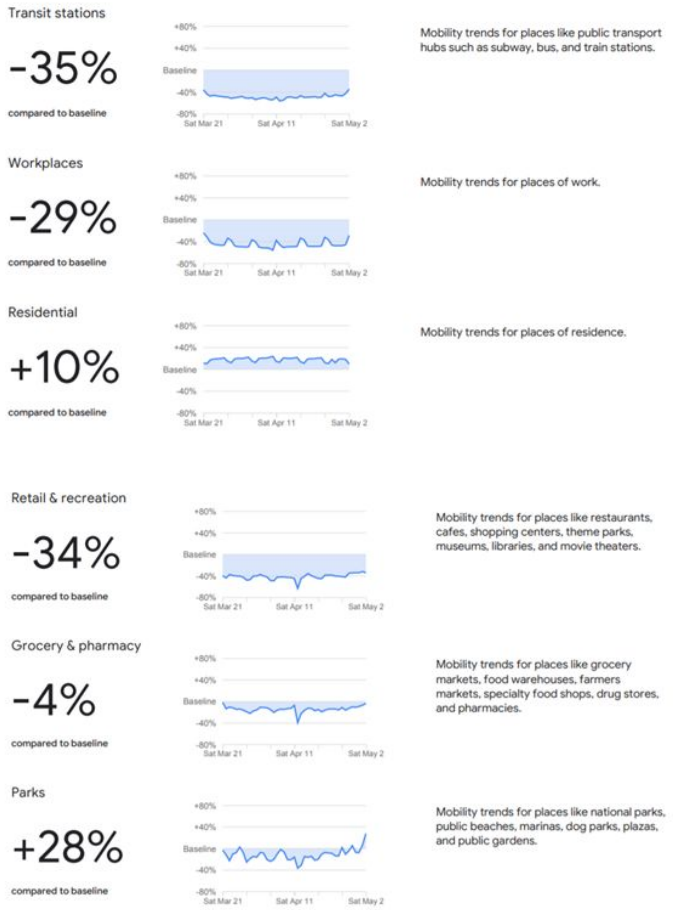


Problem Overview

- 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

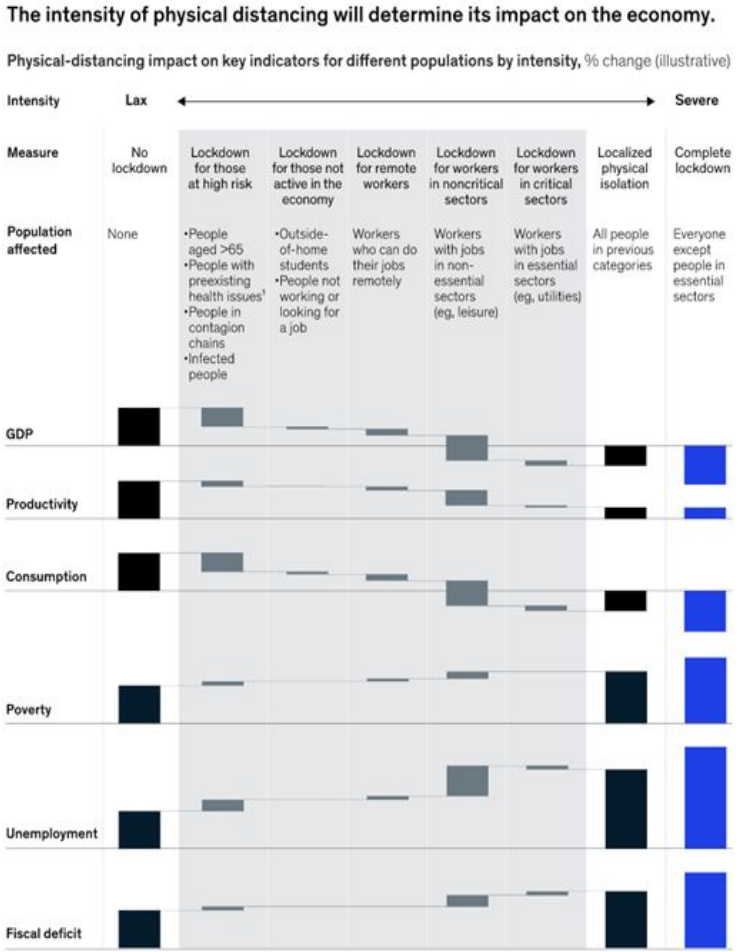
Problem Overview

- 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



Problem Overview

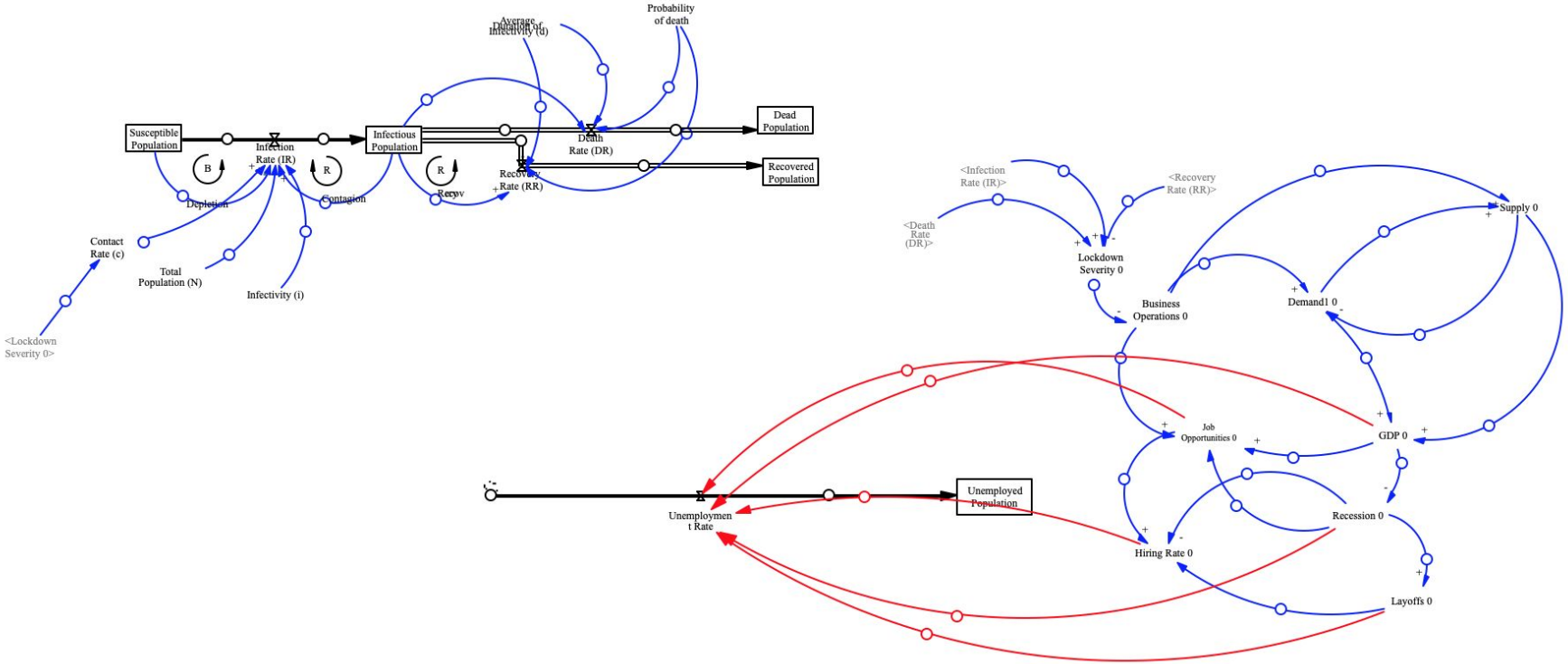
- Lockdown policies nationwide
  - Limited economy to business deemed essential
  - Reduced contact rate, but increase in unemployment
  - Negative impact on the economy
- Graduate class of 2020
  - Entering restricted job market
  - Decrease in on-site employment



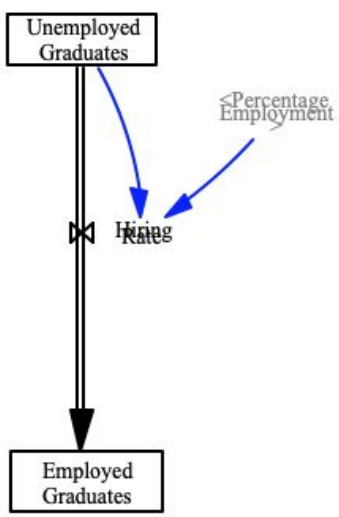
System Definition

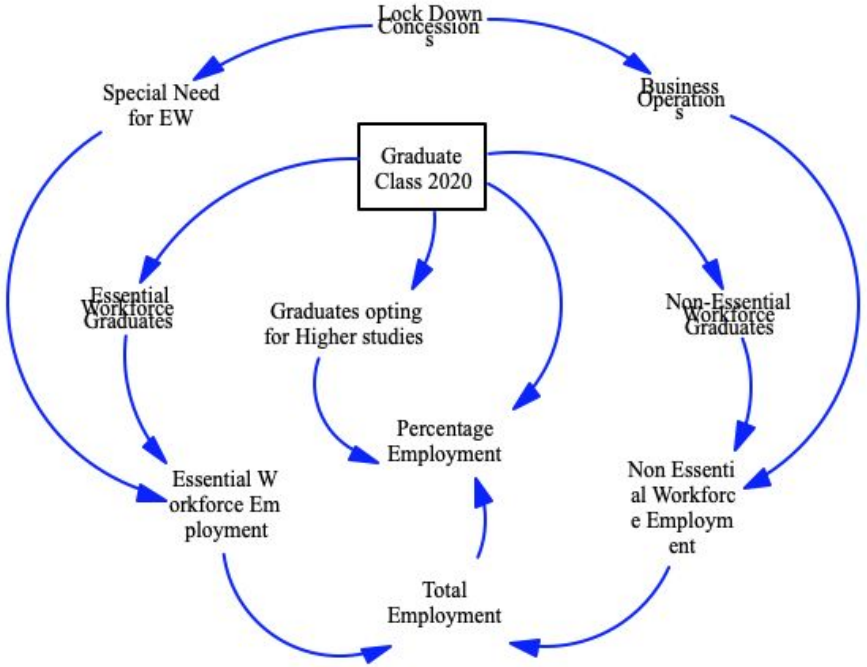
- SIR Model
  - Susceptible, Infected, Recovered, Dead
- Influence on public perception and lockdown policy
  - Reduced business operation
  - Reduced supply and demand
  - Available jobs decrease, hiring freezes, layoffs
- Employment
  - Affected adversely by economic results of lockdown
- Graduate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

Conceptual Model

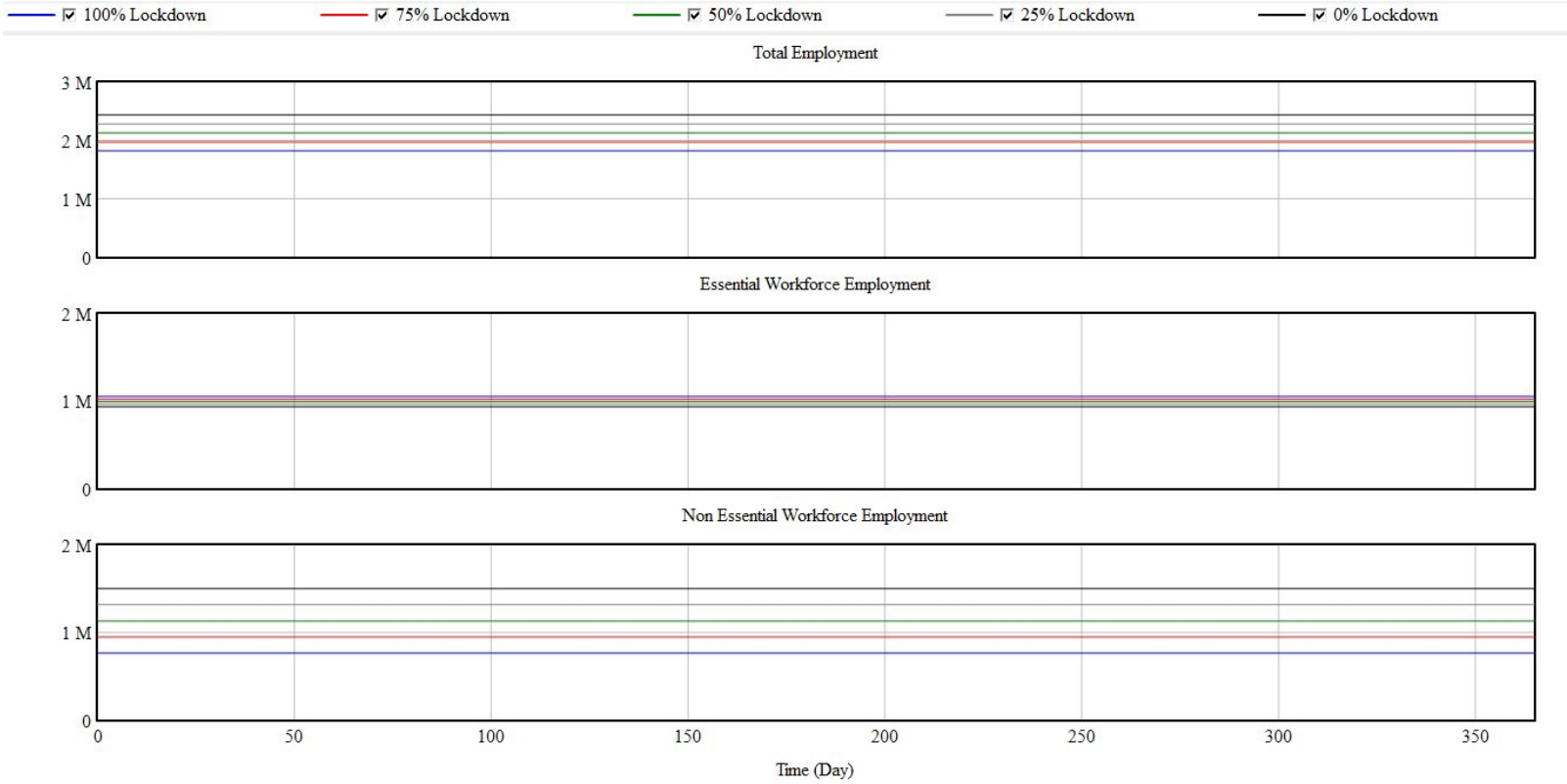


Simulation Model

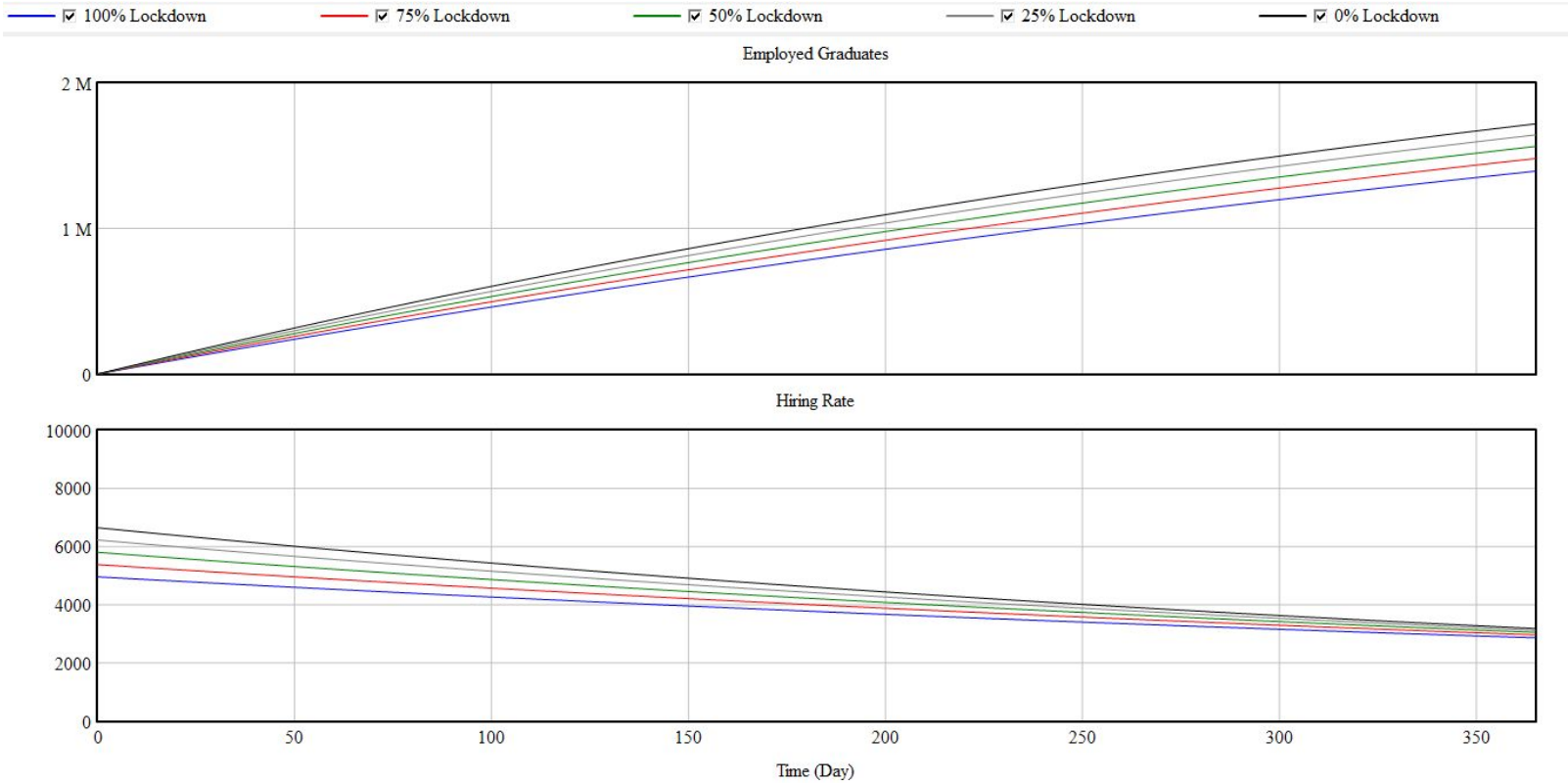




Simulation Results



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