



**INTERNATIONAL  
MONETARY FUND**

**Measuring the Economics of a Pandemic:  
How People Mobility depict Economics? An Evidence of  
People's Mobility Data towards Economic Activities**



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# MEASURING THE ECONOMICS OF A PANDEMIC

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## OUTLINE





# Introduction

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## Background

- Increased need for high quality and real-time data in crisis time
- Indonesia impose social restriction, so some survey activities could not be conducted
- Need to modernize the data life cycle of compilation, production, and dissemination to make it robust to shocks, including pandemic.

## Contribution

- Combining traditional and non-traditional data sources, including big data on mobility and GDP data.
- Measuring economic activities under social restriction which lead to delay on data collection
- Utilizing big data as new data source; more reliable in presence of disruptions, including social activities restriction.



# Methodology :

## *Combining traditional and non-traditional data*

### Official Statistics

- Regional GDP
- GDP



### Mobility

- Google Mobility Index
- Apple Mobility Index



### NTL

- Night-time light (NTL)



# Methodology: **Process**

## **Clustering each region**

1

Based on Industry Contribution to Regional GDP

2

## **Calculate People Mobility Change**

Based on Google Mobility Index and Apple Mobility Index

## **Estimated Regional GDP Growth**

3

Regression interaction between Regional GDP, Mobility and cluster.

4

## **Estimated the GDP Change**

Calculate the National GDP

## **Evaluation**

5

Estimated GDP vs. Nigh-time Light (NTL)

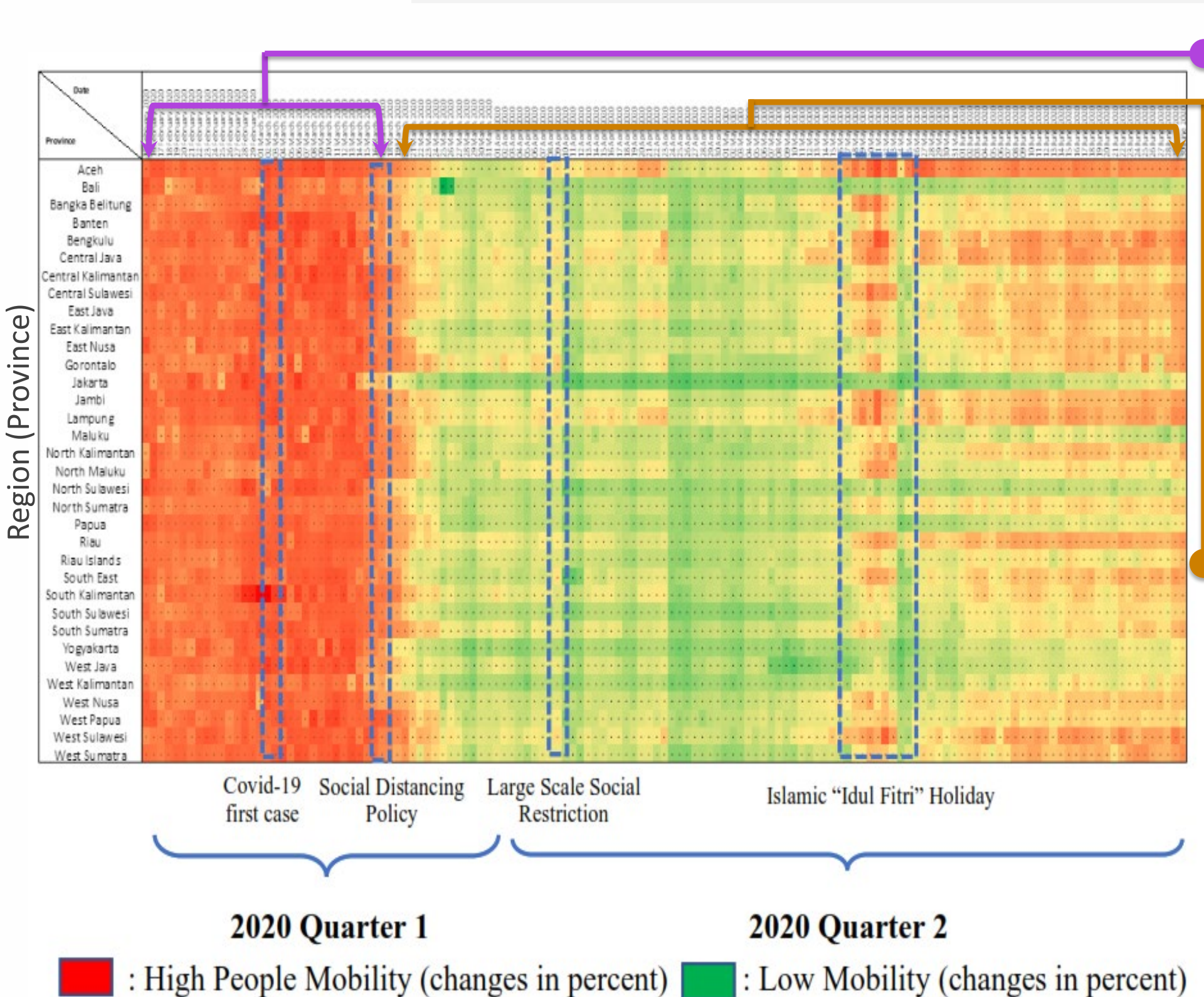


# DISCUSSION



# Mobility and Level of Economic Activity

People Mobility → Economic Activities → Output → Economic Growth



## BEFORE PANDEMIC (Baseline)

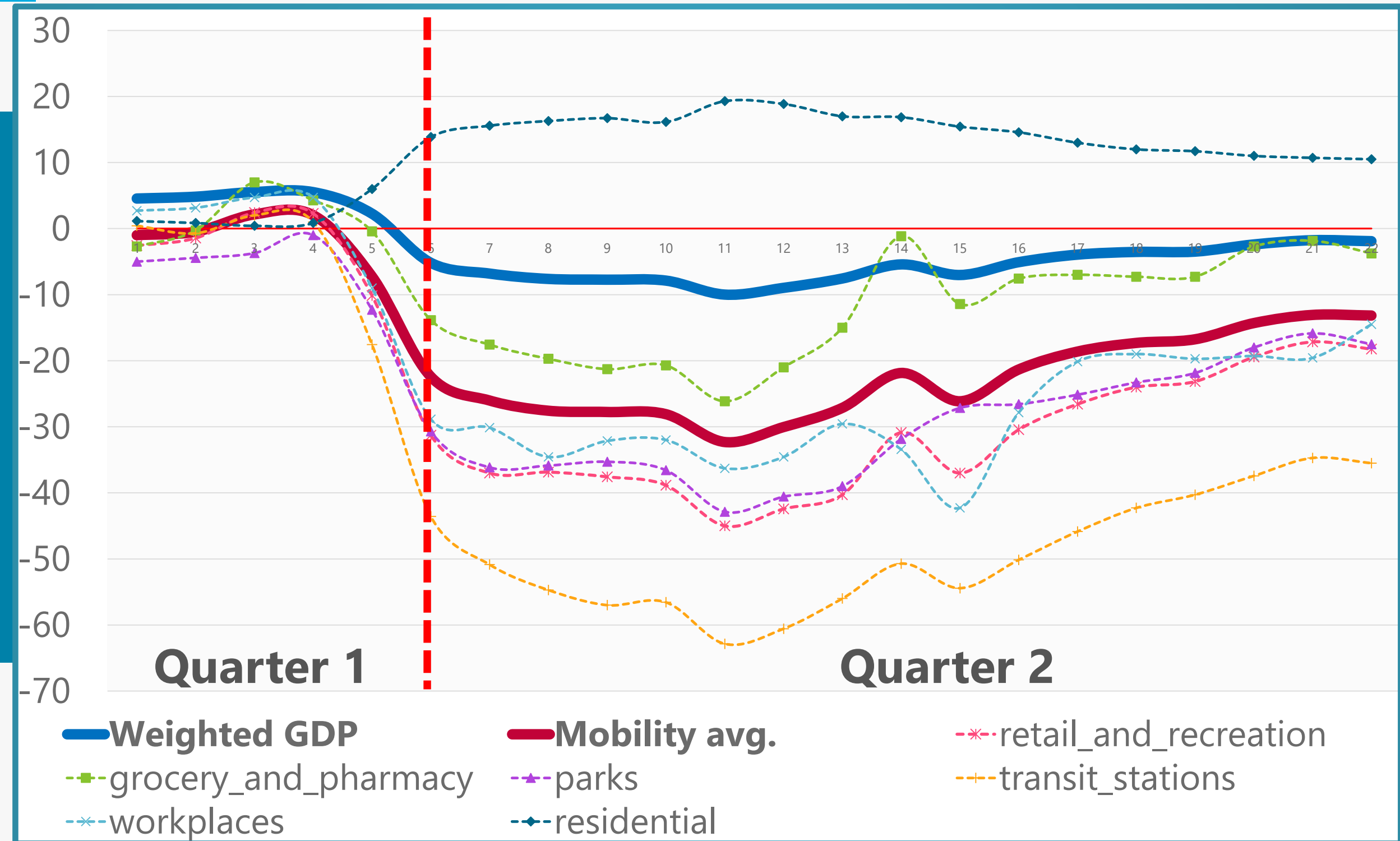
- pre-COVID people's normal mobility patterns as baseline
- Economic activities in absence of shock

## DURING PANDEMIC

- Social activities restrictions (less economic activities)
- Behavioural changes; e.g. work from home
- Adjustment in measuring economics of a pandemic

# Mobility change

Activity increase in places of residence, while decrease in other place, such as workplace, retail, parks, recreation



- Indonesia start social restriction since March 2020
- In Quarter 2, the decreasing of people mobility is bigger than Quarter 1





# Clustering

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## Motivation

- Each Region has different industry contribution to regional GDP
- Mobility changes affect each industry differently
- Minimizing bias due to mobility change effects on industry

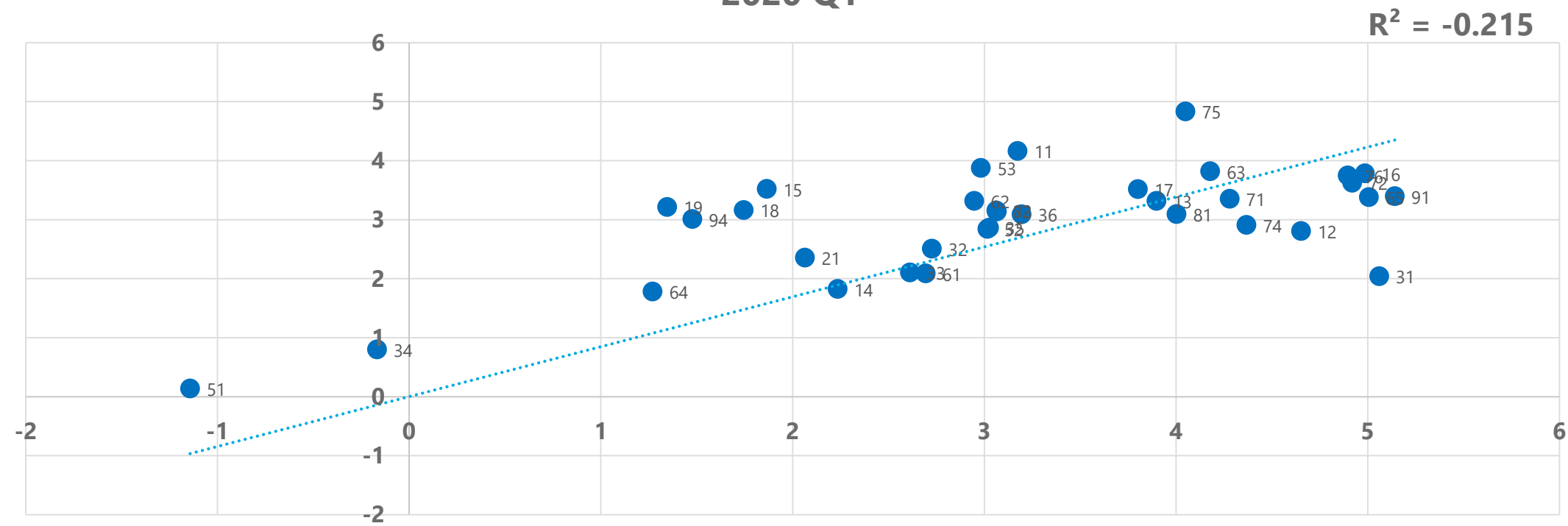


## Outcome

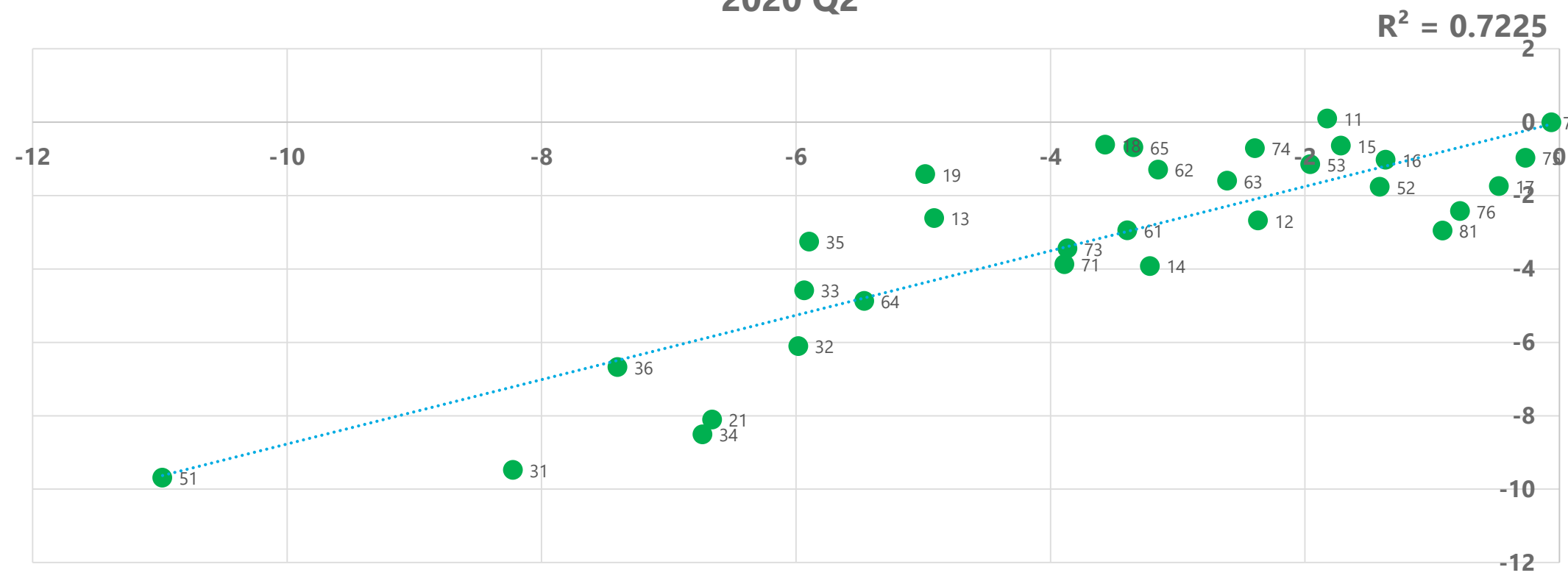
- Increases the explanatory power of mobility for regional GDP
- Provide better fit model to estimate the regional and national GDP

# Estimated and Official Regional GDP Growth

Plot GDRP Growth with Estimated Growth  
2020 Q1



Plot GDRP Growth with Estimated Growth  
2020 Q2



## Estimated and Official Regional GDP

- Mobility change can explain 89% GDP Growth in 2020 Quarter 1 and 88% GDP Growth in 2020 Quarter 2
- Since Indonesia does not impose lockdown to reduce the spread of COVID-19, some industries are still operated during the pandemic.



# Estimated and Official GDP Growth



## 2020 Quarter 1

- Official : 3.0%
- Estimated : 2.6%



## 2020 Quarter 2

- Official : -5.4%
- Estimated : -5.2%



# Conclusion



## Clustering

Each region is clustered based on industry contribution to Regional GDP to reduce the effect of some industries that are not significantly affected by mobility.



## Mobility and Regional GDP

Consistently strong positive correlation between regional change of the average mobility and the percentage changes of Regional GDP



## GDP

The estimated and the Official GDP growth are close.



# Future Work

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- How mobility differently affects GDP among underdeveloped, developing, and developed country?
  - How mobility differently affects GDP among countries which impose lockdown or only social restriction
  - Adjust the baseline GDP with NTL data especially for countries which have low-quality national accounts data to improve comparability across regions.



# IMF Statistical Forum

**Thank You**



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