# Pandemic and Employment: Evidence from COVID-19 in South Korea

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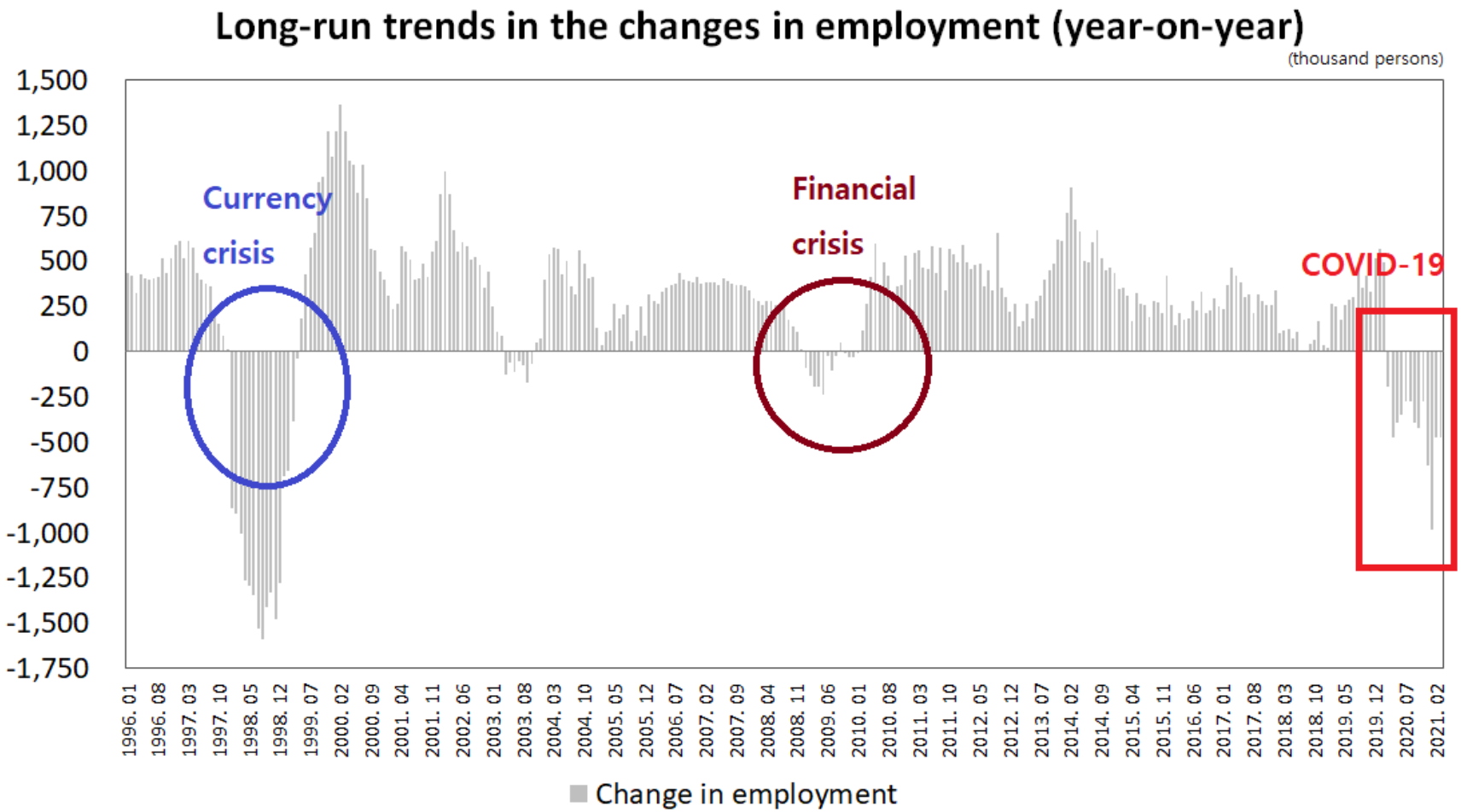
# Motivation

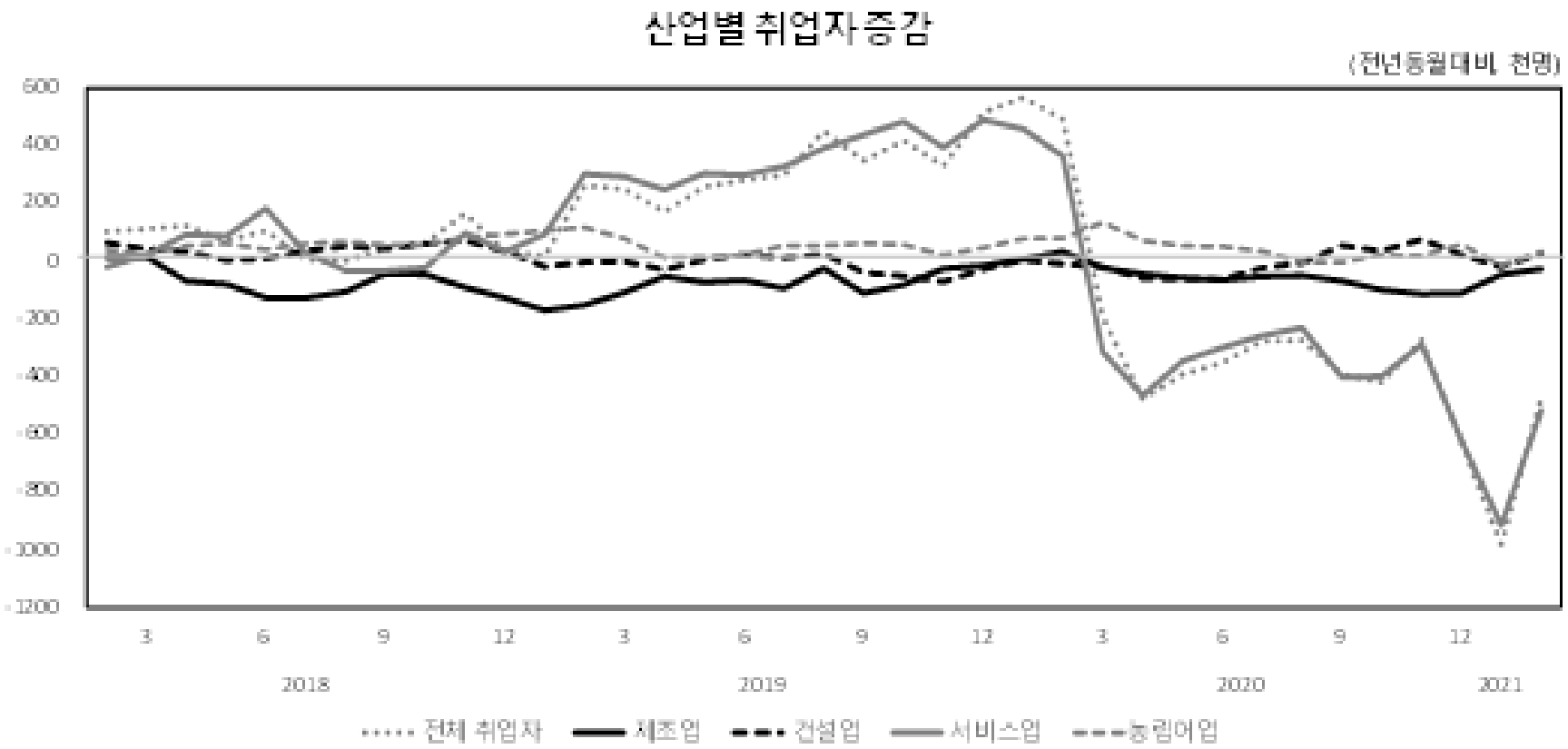
- **Deterioration** of the labor market since the outbreak of **COVID-19**
  - Still ongoing, but certainly worse than the financial crisis during 2008-2009




- But we do **NOT** know much about the nature of the current crisis

# Motivation

- Year-on-year changes in employed persons:
  - **Large** decrease in **service** sectors
  - **Small** negative effects in **manufacuring**




- Is that all? What is **different**?
- What is the **causal** impact of this **unprecedented** crisis?

# This Paper

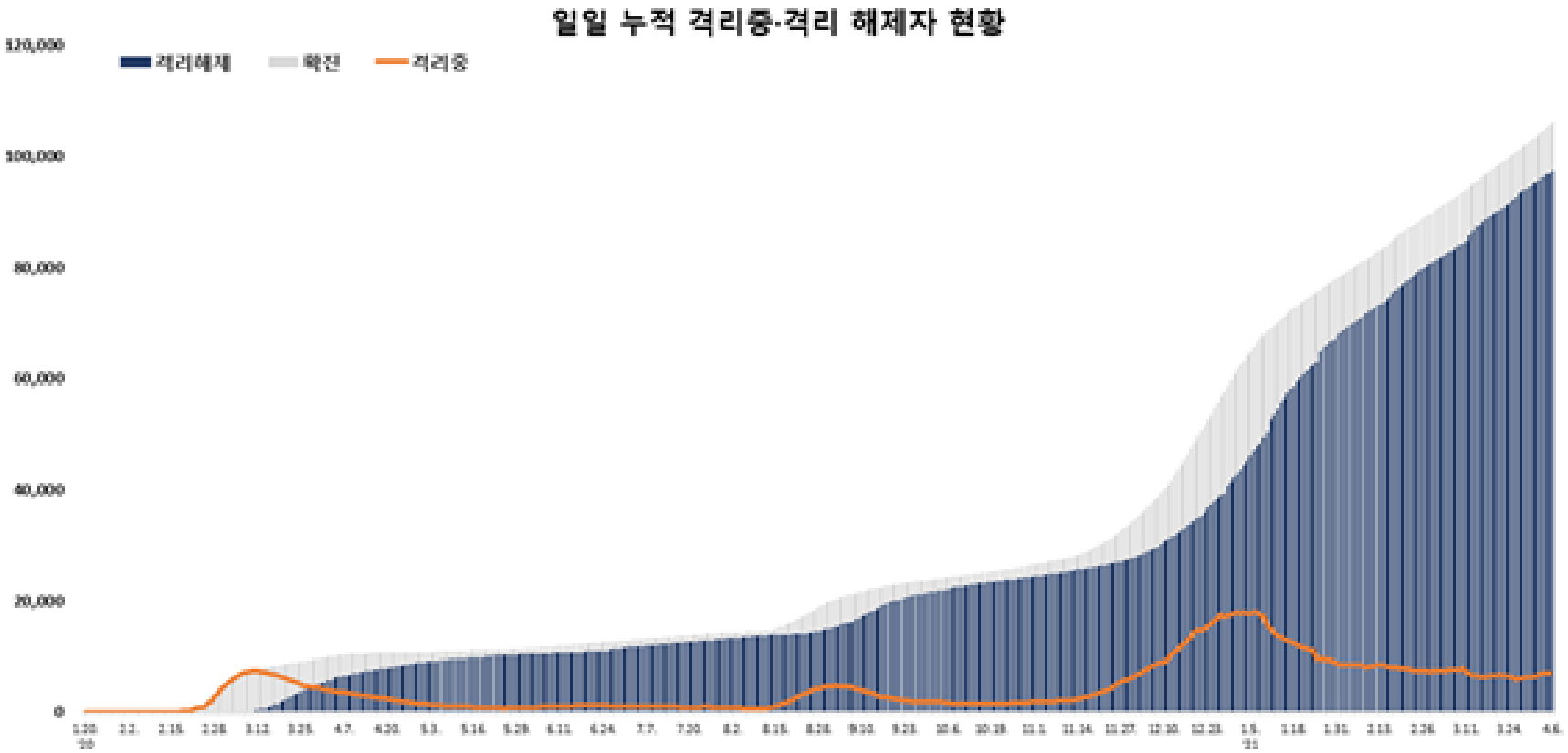
- Provides the consequences of the COVID-19 pandemic in South Korea
- Data: Economically Active Population Survey (EAPS)

**Two complement approaches:**

1. The synthetic control method (Abadie and Gardeazabal 2003)
   - Reproduces the **counterfactuals** in the absence of the COVID-19
   - Estimates the "**nationwide**" labor market impact of the COVID-19
2. Exploiting the regional variation in the COVID-19 intensity
   - Measures the "**direct**" effect of COVID-19
   - The direct risk of infections due to more confirmed cases

# Background: COVID-19

- The first case in South Korea: January 20, 2020
- Outbreak in Daegu-Gyeongbuk after the 31st patient: February 17, 2020
- 2nd wave: August - September
- 3rd wave: November - ?
- 4th wave?



# Data

- Economically Active Population Survey (EAPS)
  - A **monthly** survey of 35,000 households
  - Information: employment by industry, worker status, region, and etc.
  - Reference period is one week which includes the **15th** of the month
- We focus on the period **Feb 2020 - Dec 2020**

# Estimating Overall Effects

- The synthetic control method: **counterfactual** in the absence of the event
  - A systematic way to analyze a case that only one unit is affected by an event
  - Constructing a weighted average of the controls in the donor pool
  - Comapring the actual changes with the counterfactuals (DID)
- We include the **historical series** (of South Korea) in the **donor pool**
  - The year-on-year changes in employment during 2005-2019
  - 24-months window: Jan 2005-Dec 2006, Jan 2006-Dec 2007,...
  - Instead of other regions or countries
- **Matching** Variables
  - Employment by industry, educational attainment, and worker status

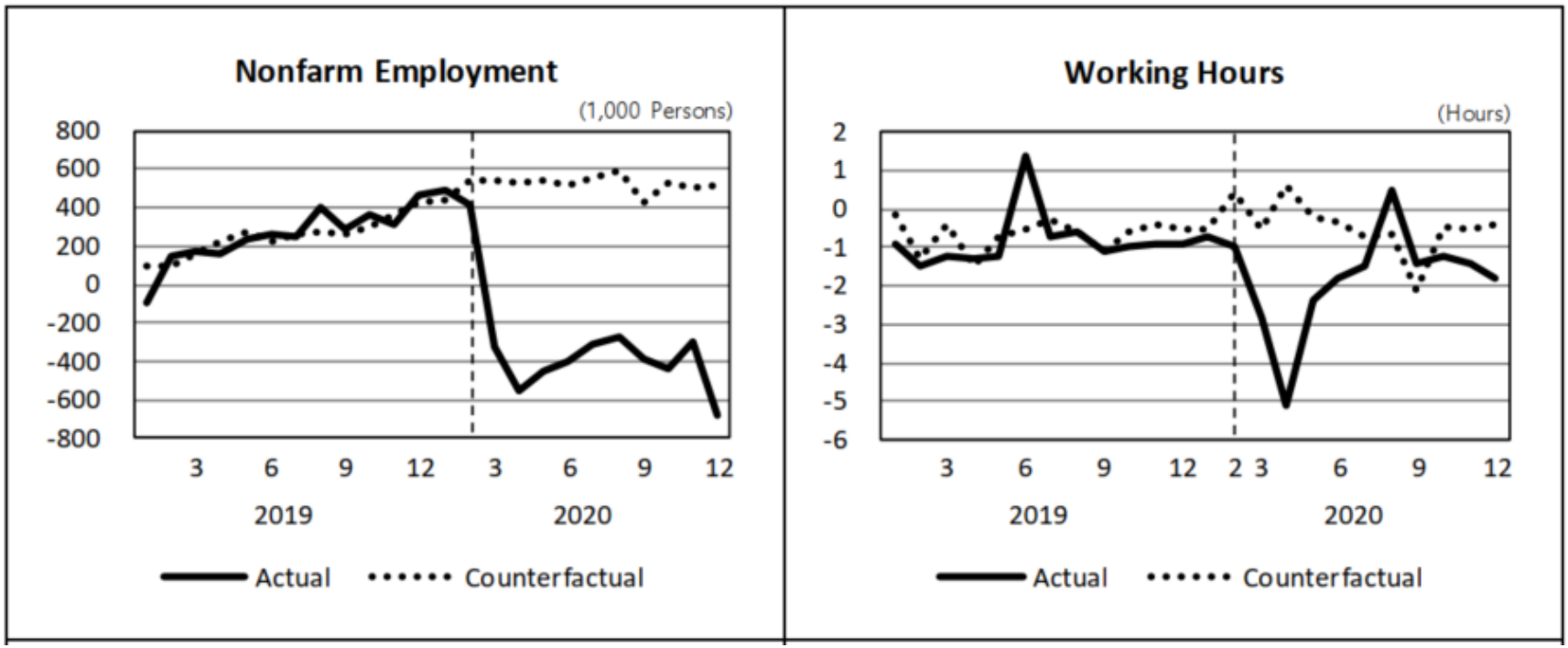
# Estimating Overall Effects

- **Composition** in the synthetic control

| Outcome Variable | Years used in making the synthetic control (%) |
|---|---|
| Nonfarm Employment | 2009-2010: 33.5<br>2010-2011: 42.2<br>2013-2014: 24.3 |
| Working Hours | 2005-2006: 2.2<br>2006-2007: 14.0<br>2008-2009: 12.8<br>2010-2011: 17.0<br>2016-2017: 54.0 |
| Service Employment | 2010-2011: 32.9<br>2011-2012: 39.6<br>2013-2014: 9.5<br>2016-2017: 18.0 |

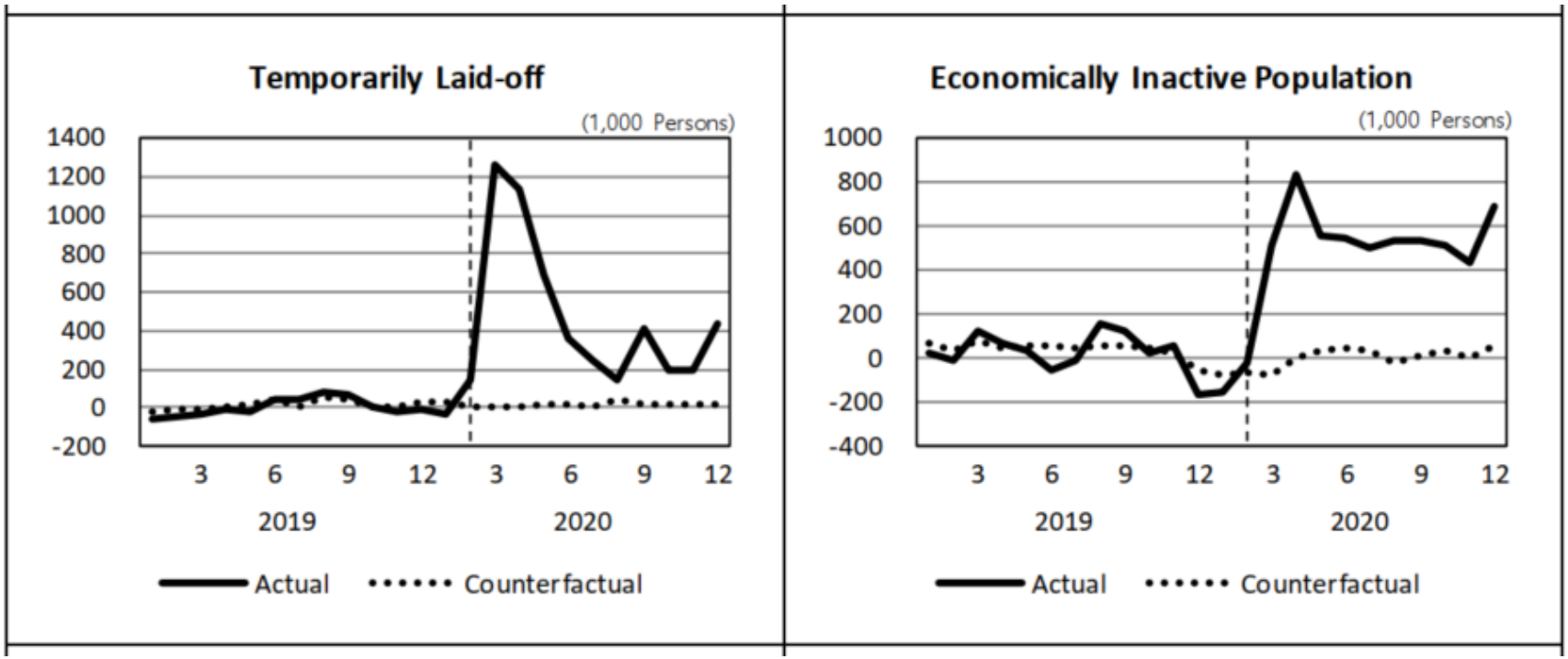
# Overall Effects

- Decrease in **employed** persons = 1.1 million (4.2% of nonfarm employment)
- Decrease in weekly **hours** worked = 5.7 hours



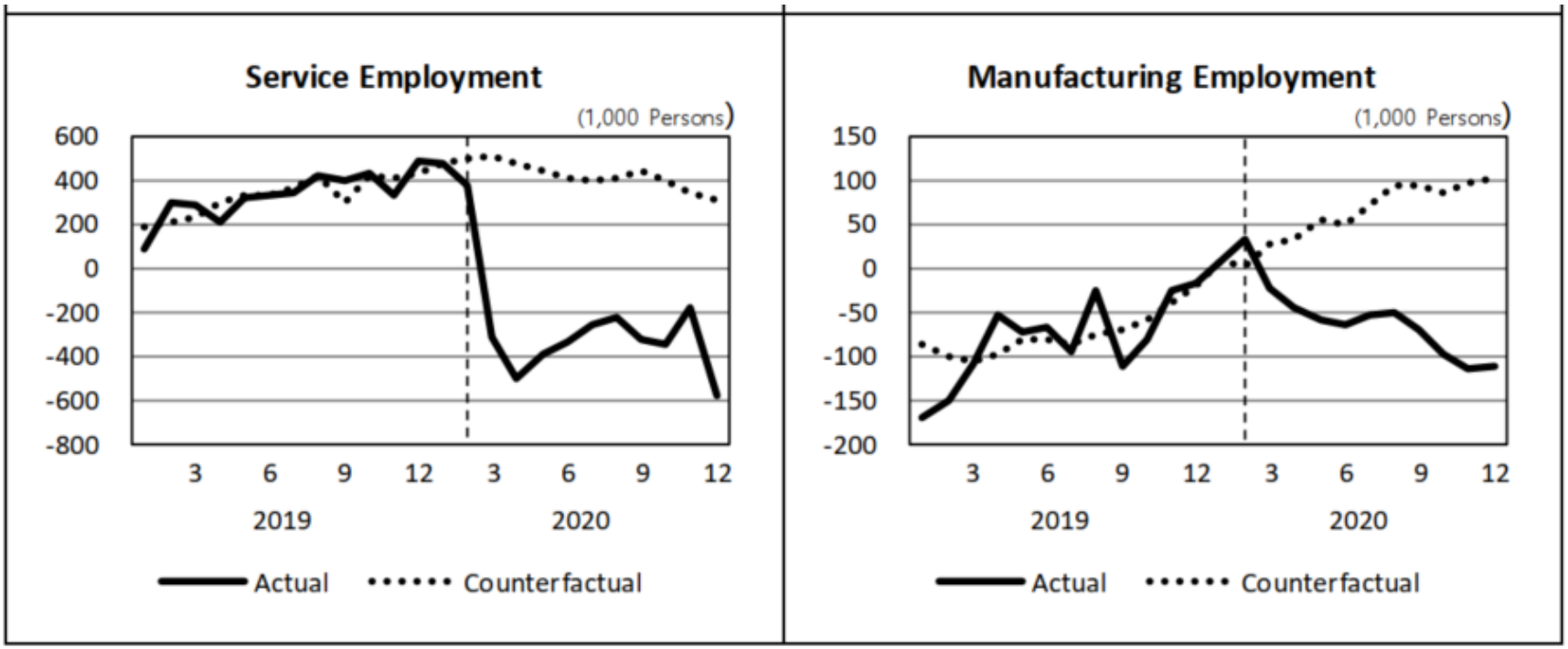
# Overall Effects

- Increase in **temporarily laid-offs** = 1.1 million
  - included in the employed persons
  - employed $\downarrow$ + temporarily laid-offs $\uparrow$ = 8.4% shock
- Increase in "economically **inactive** population" = 827,000

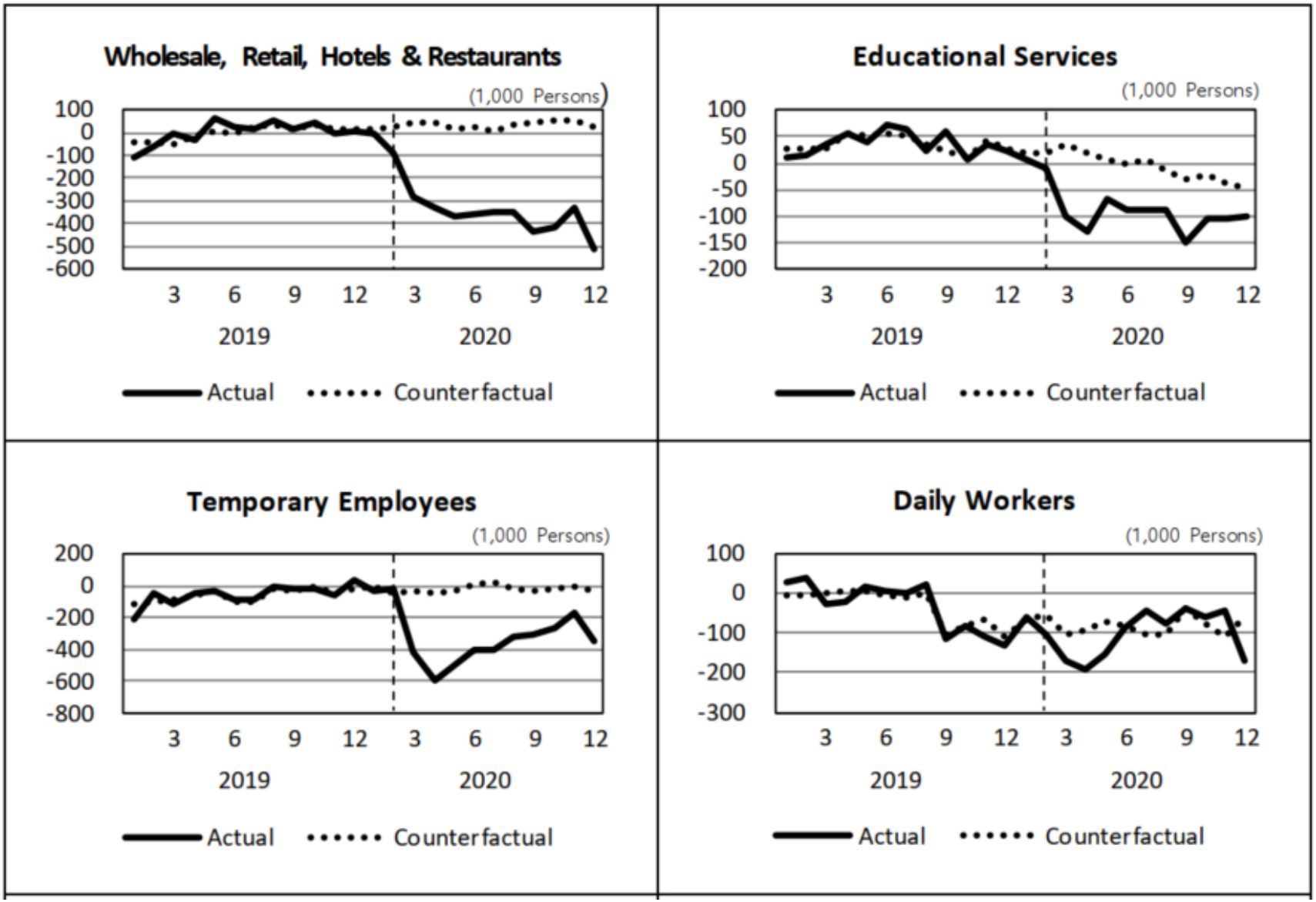


# Overall Effects

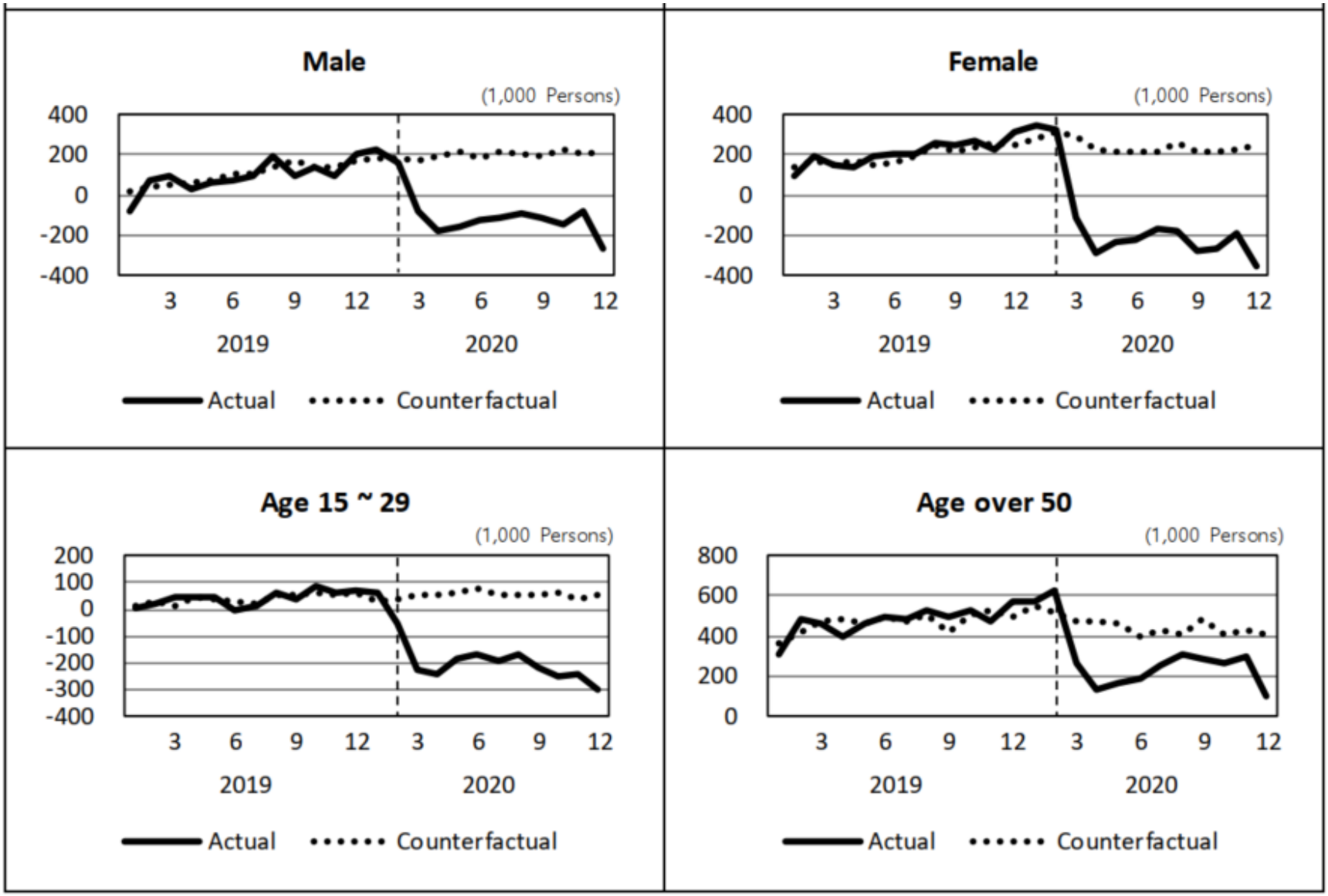
- Service = 990,000 decrease
- Manufacturing = 78,000 decrease



# Overall Effects: Sub-groups



# Overall Effects: Sub-groups



# Overall Effects: Sub-groups

- Temporarily laid-offs & economically inactive population:

  **Directly** follows the waves

- The effect on service employment seems **1-month lagged** after each wave

- The effect on manufacturing seems **not very correlated** with the waves, except for the 1st wave

# Exploiting Regional Variation

# Exploiting Regional Variation

| | Mar 2019 – Mar 2020 | | Aug 2019 – Aug 2020 | | Dec 2019 – Dec 2020 | |
|---|---|---|---|---|---|---|
| City | Employment (%Δ) | COVID-19 intensity | Employment (%Δ) | COVID-19 intensity | Employment (%Δ) | COVID-19 intensity |
| Daegu | -7.4% | 0.247 | -2.2% | 0.285 | -0.7% | 0.303 |
| Gyeongbuk | -1.6% | 0.043 | -0.6% | 0.053 | -2.3% | 0.070 |
| Sejong | 6.6% | 0.011 | 7.9% | 0.015 | 4.1% | 0.038 |
| Chungnam | -3.8% | 0.005 | 0.2% | 0.010 | -3.1% | 0.054 |
| Busan | -1.0% | 0.003 | -2.5% | 0.006 | -2.9% | 0.038 |
| Seoul | 0.7% | 0.003 | -1.0% | 0.019 | -2.0% | 0.130 |
| Gyeongnam | -1.7% | 0.003 | -0.7% | 0.005 | -3.8% | 0.026 |
| Ulsan | -1.1% | 0.002 | -2.0% | 0.005 | -3.7% | 0.042 |
| Chungbuk | 1.7 % | 0.002 | 0.1% | 0.005 | 0.6% | 0.036 |
| Gangwon | -0.3% | 0.002 | -3.7% | 0.005 | -4.2% | 0.054 |
| Gyeonggi | 0.0% | 0.002 | -1.6% | 0.014 | -2.8% | 0.077 |
| Daejeon | 0.9% | 0.001 | 0.0% | 0.011 | 0.2% | 0.045 |
| Gwangju | -1.2% | 0.001 | -0.8% | 0.015 | -0.3% | 0.057 |
| Incheon | -1.9% | 0.001 | -0.4% | 0.013 | -3.3% | 0.065 |
| Jeju | -1.3% | 0.001 | -1.3% | 0.004 | -2.8% | 0.019 |
| Jeonbuk | -0.4% | 0.000 | 1.7% | 0.002 | -1.1% | 0.029 |

# Exploiting Regional Variation

- DID with the term $\frac{COVID19_r}{Pop_{r,2019}}$ being treatment **intensity**

$$\frac{\Delta Emp_r}{Pop_r, 2019} = \alpha + \beta \frac{COVID19_r}{Pop_{r,2019}} + \gamma X_r + \varepsilon_r$$

  - $\Delta Emp_r$: Change in employment of region $r$
  - $COVID19_r$: # of confirmed cases (cumulative) of region $r$
  - $Pop_{r,2019}$: total population of region $r$
  - $X_r$: Log of population, Seoul capital area dummy, share manufacturing
  - Weighted by regional population

- $\beta =$ **# of jobs lost** as a result of one more confirmed case
- Assumption: the occurrence of cases is **random** across regions

# Direct Effects

| | (1) Nonfarm employment | (2) Working hours | (3) Service employment | (4) Manufacturing employment | (5) High school graduates | (6) Daily/ Temporary workers | (7) Youth (Age 15 - 29) |
|---|---|---|---|---|---|---|---|
| **Panel A: March 2020** | | | | | | | |
| $\frac{COVID19_r}{Pop_{r,2019}}$ | -13.681*** | -0.739*** | -9.924*** | -3.489** | -16.192*** | -9.530*** | -2.479** |
| | (1.970) | (0.085) | (1.761) | (1.563) | (2.183) | (1.485) | (0.960) |
| **Panel B: April 2020** | | | | | | | |
| $\frac{COVID19_r}{Pop_{r,2019}}$ | -9.303*** | -0.332** | -6.362*** | -2.983* | -13.279*** | -7.328*** | -1.889** |
| | (1.644) | (0.132) | (1.164) | (1.533) | (1.890) | (1.286) | (0.670) |
| **Panel C: May 2020** | | | | | | | |
| $\frac{COVID19_r}{Pop_{r,2019}}$ | -5.574** | -0.303** | -2.842** | -2.877** | -12.489*** | -4.468*** | -0.497 |
| | (1.836) | (0.120) | (1.236) | (1.274) | (2.061) | (1.461) | (0.756) |
| **Panel D: August 2020** | | | | | | | |
| $\frac{COVID19_r}{Pop_{r,2019}}$ | -2.982** | -0.115 | -0.401 | -2.979* | -10.687*** | -3.527** | 0.836 |
| | (1.228) | (0.108) | (1.275) | (1.505) | (1.873) | (1.239) | (0.609) |
| **Panel E: September 2020** | | | | | | | |
| $\frac{COVID19_r}{Pop_{r,2019}}$ | -2.448 | -0.158 | 0.352 | -2.929* | -10.961*** | -3.799* | 0.132 |
| | (1.418) | (0.103) | (1.633) | (1.477) | (1.962) | (1.829) | (0.658) |
| **Panel F: December 2020** | | | | | | | |
| $\frac{COVID19_r}{Pop_{r,2019}}$ | -1.832 | 0.085 | 0.457 | -2.300 | -8.964*** | -4.466* | -0.289 |
| | (2.406) | (0.062) | (2.172) | (1.400) | (2.486) | (2.484) | (0.884) |

- March 15: -13.681 * 8,162 cases = -111,664
- April 15: -9.303 * 10,198 cases = -94,871

# Putting Together

**Direct Effect:**

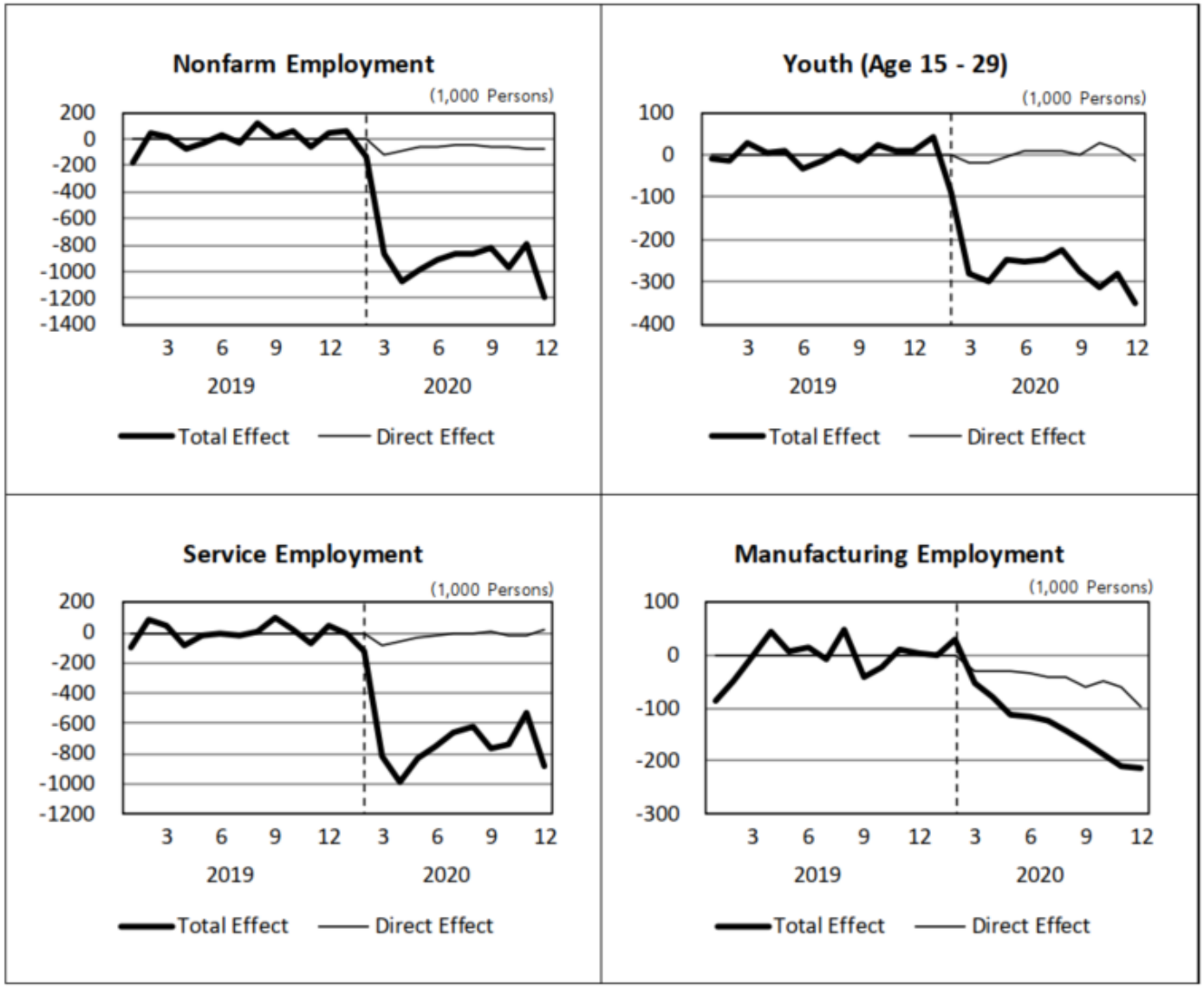
- Estimated using regional distribution of confirmed cases
- The size of the direct effect is proportional to the intensity of the virus (only in the beginning)

**Indirect Effect:**

- The overall domestic and global factors that are likely to affect most regions
- Fear of infection
- Nationwide policies such as social distancing
- Decrease in global demand

# Putting Together

- Only **7%** of nationwide job losses are explained by regional variation



# Why?

- **Nature** of the current crisis: **Pandemic**
  - **Contagious** disease travels **between** geographical **regions**
  - **Outbreak** in one region affects **the other regions** significantly
- **Fear** of infection itself has refrained many citizens from going outside
- Studies using regional variation may **underestimate** the true effects
  - e.g., Correia et al. (2020)

# Policy Implications

- Using **regional** variation may not be appropriate
  - In understanding the **overall** impact of the pandemic
  - Both the **direct** and **indirect** factors should be considered together
- Policies **targeting specific regions** with lots of cases may **NOT** be effective
  - Such as designating Daegu as a "special disaster area"
  - The key is nationwide **preventive** measures to reduce the **fear**
- Retrospectively, was **employment retention policy** effective?
  - What should have done differently?