



COVID-19 Thematic Report No.2

Economic Effects of Lockdown in China¹

Qin Chen, Zhiguo He, Chang-Tai Hsieh and Zheng (Michael) Song

On January 23 2020, the Chinese government locked down the city of Wuhan (Hubei Province). In subsequent days, similar measures were taken in other cities in Hubei and throughout China. This letter documents several facts of Chinese economy since the lockdown. The main findings are summarized as follows.

- (1) The impacts of the lockdown on various economic activities, from flows of people and goods to aggregate output, were immediate and dramatic.
- (2) Flows of people and goods outside Hubei have recovered to the pre-lockdown period. But daily visits to shopping malls and office buildings remain one third lower than the pre-lockdown level.
- (3) The size and structure of consumption expenditure also experienced substantial adjustments.

¹ Chen: Business Big Data, Chengdu, China; He: University of Chicago, Booth School of Business; Hsieh: University of Chicago, Booth School of Business; Song: Chinese University of Hong Kong, Department of Economics. We thank Jingjing Chen and Nian Liu for their contributions.



We begin with official data provided by China's National Bureau of Statistics (NBS). The most recent data (as of March 31, 2020) is from February 2020. Figure 1 shows that industrial value added fell by 4.3% and 25.9% in January and February of 2020 on a year-on-year basis. If the counterfactual growth in absence of the epidemic is 5.7%, the average growth in 2019, the slump would be even more dramatic.

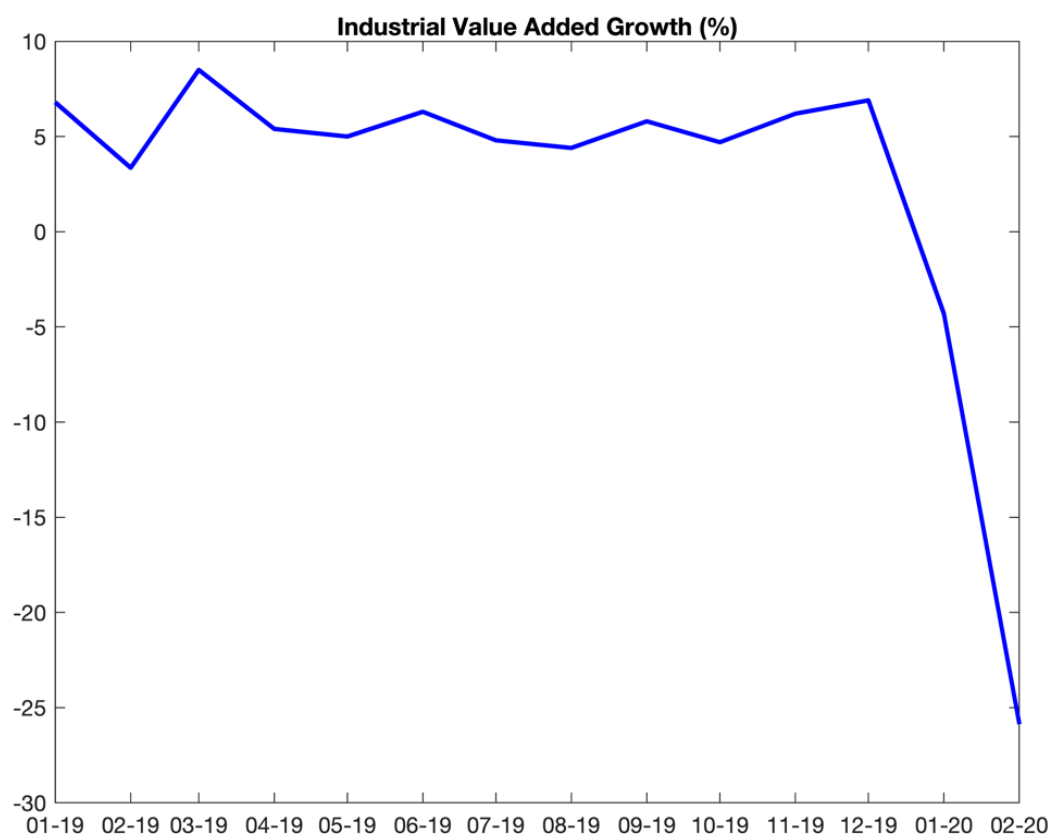


Figure 1: Growth in Industrial Value-Added (NBS). All the changes are on a year-on-year basis. Data source: WIND.

An alternative way to measure industrial output is data on shipment of goods across Chinese cities. We have data from a private trucking company that provides logistical services to truck drivers. This company, G7, has real-time GPS data from two million trucks, accounting for about 10 percent of all trucks operating in China. We aggregated the movement of trucks in and out of a provincial capital by day. Figure 2 plots the daily truck flows between provincial capital cities, with the beginning day of the year normalized to one. The decline of truck flows before Wuhan lockdown captures the slowdown associated with the coming Chinese New Year. Strikingly, the truck data suggests goods flows between Wuhan and the other provincial capital cities remained at a very low level and did not recover until the mid-March.

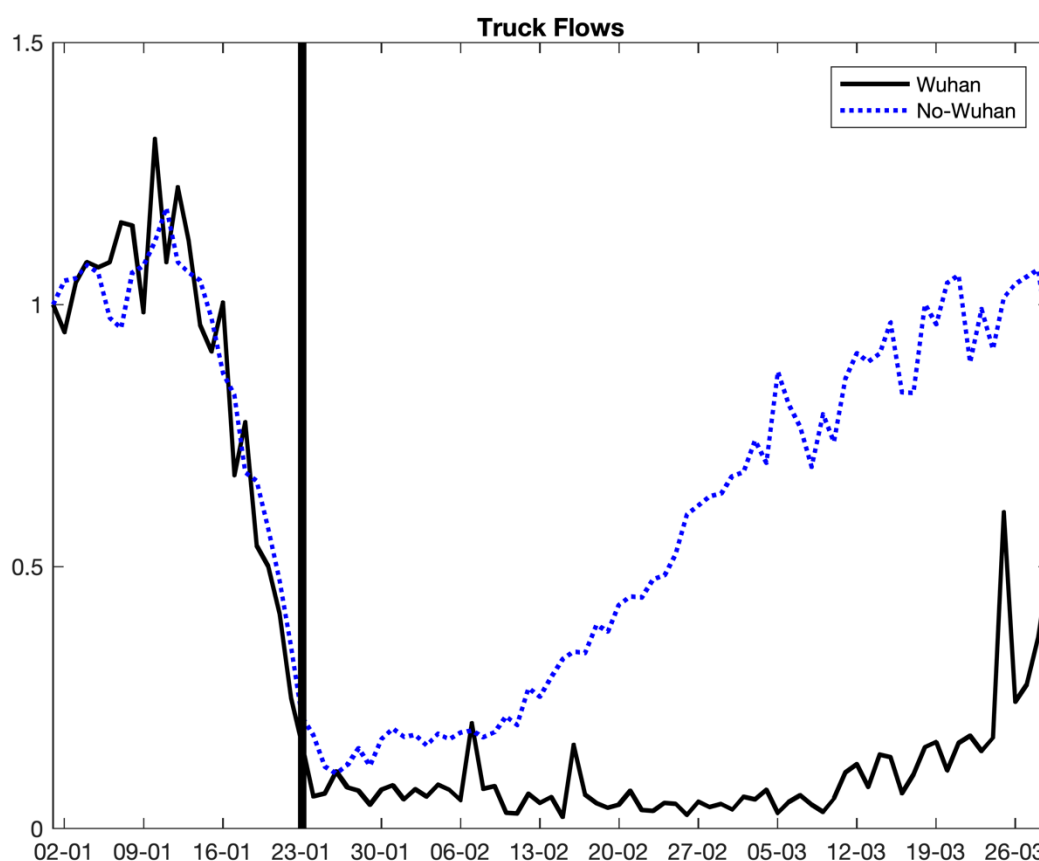


Figure 2: Truck Flows among Provincial Capital Cities, with the beginning day of the year normalized to one. The black bar marks Wuhan lockdown. The solid and dotted lines are for truck flows that involves and does not involve Wuhan, respectively. We use the 2018 regional trade flow data as weights for aggregation. Data Source: G7.

Figure 2 also shows that truck flows among the other provincial capital cities has recovered to the pre-lockdown level at the end of March. The stop of goods flows in the late January and early February is consistent with the dramatic decline (-26% as shown in Figure 1) of industrial output in February.

The next data we show are flows of people within and between cities. Here, we use indices of movements of people provided by Baidu. This data is based on location-based services in Baidu Map. Figure 3 plots within-city travel intensity, with the beginning day of the year normalized to one. Panel A and Panel B plot the data for 2019 and 2020, respectively. The red bar in Panel A marks the 2019 Chinese new year. The black bar in Panel B marks Wuhan lockdown, which is two days before the 2020 Chinese New Year and exactly precedes the free fall of within-city travels in Hubei. The index dropped by more than half within a three-day window and remained low for six weeks, only to pick up recently until the mid-March. The indices outside Hubei were picking up more rapidly and have almost reached the level in the early January.

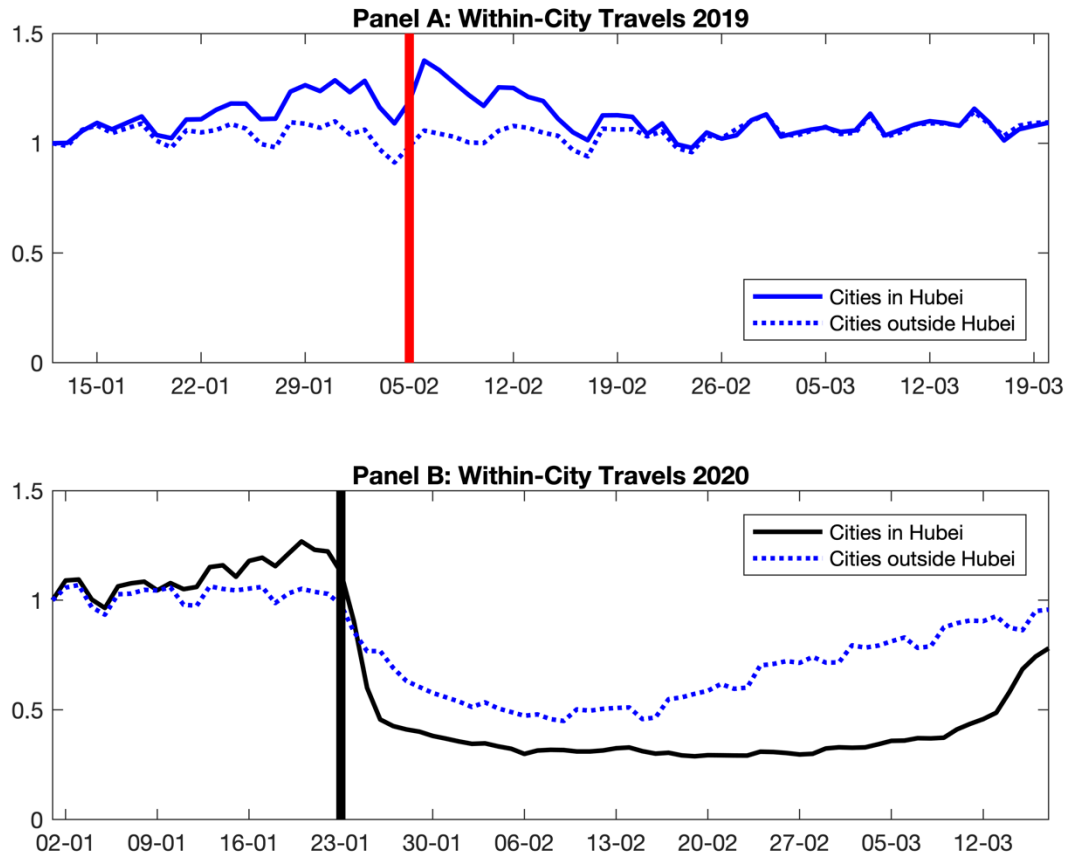


Figure 3: Baidu Within-City Travel Index plots within-city travel intensity with the beginning day of the year normalized to one. Panel A and B plot the data for 2019 and 2020, respectively. The red bar in Panel A marks the 2019 Chinese new year. The black bar in Panel B marks Wuhan lockdown, two days before the 2020 Chinese new year. The solid and dotted lines are for within-city travels in and outside Hubei, respectively. We use city population in the 2010 census as weights to aggregate city-level indices.

The movement of people across Chinese cities were more severely affected, as shown in Figure 4. The travels to/from cities in Hubei were nearly frozen. The cross-city travels that do not involve Hubei cities also experienced sharp declines, though to a less extent than those involving Hubei cities. In mid-March, the cross-city travels outside Hubei have fully recovered to its early January level.

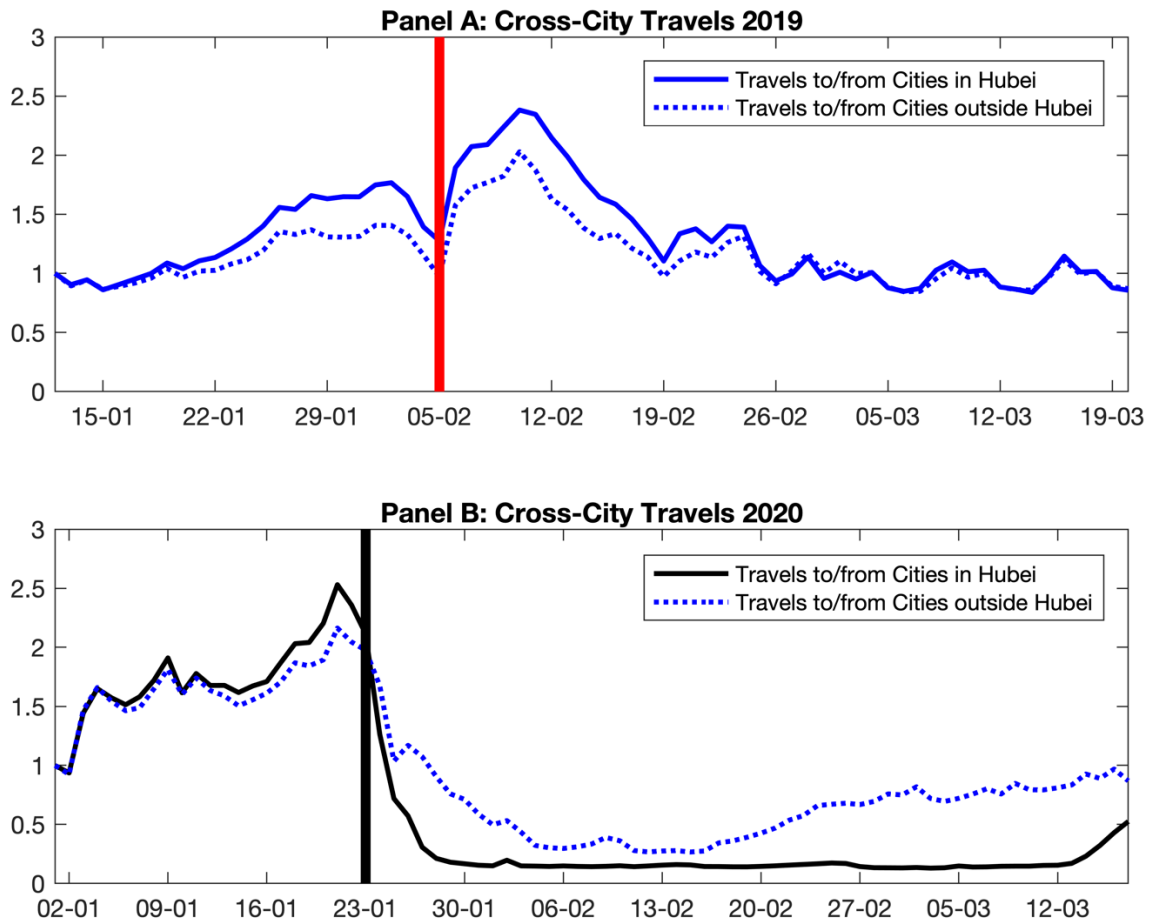


Figure 4: Baidu Cross-City Travel Index plots cross-city travel intensity, with the beginning day of the year normalized to one. Panel A and B plot the data for 2019 and 2020, respectively. The red bar in Panel A marks the 2019 Chinese new year. The black bar in Panel B marks Wuhan lockdown, two days before the 2020 Chinese New Year. The solid and dotted lines are for cross-city travels that involves and does not involve cities in Hubei, respectively. Baidu provides data on travels to and from each city. The cross-city travel index is the average of inflows to and outflows from a city. We use city population in the 2010 census as weights to aggregate city-level indices.

While flows of goods and people outside Wuhan have more or less recovered, the impacts of lockdown appear to be persistent on economic activities involving personal interactions. We obtain location data provided by the three major mobile carriers in China. We use this data to measure the number of people in shopping malls and office locations in Chinese cities. We geocoded the location of the main shopping malls. Based on these geocodes, we measure the number of people in each of these locations in a given day. Figure 5 shows the average of this number across Chinese cities in the past three months, after normalizing the number of people in a location to 1 on January 2, 2020. Again, the black vertical line denotes the date of the lockdown in Wuhan. Before the lockdown, the figure shows clearly the cycles of work and shopping within a week, as the number



of people in offices (shopping malls) falls (rises) over the weekend. We see a sharp decline of both population flows after the Wuhan lockdown. The number of people in office buildings seems to recover quicker; however, the recovery is far from complete despite the steady increase after the mid-February. The number of visits to shopping malls and office buildings were about half of their pre-lockdown levels by the fourth week of March.

Figure 5: Location in Office Buildings and Shopping Malls

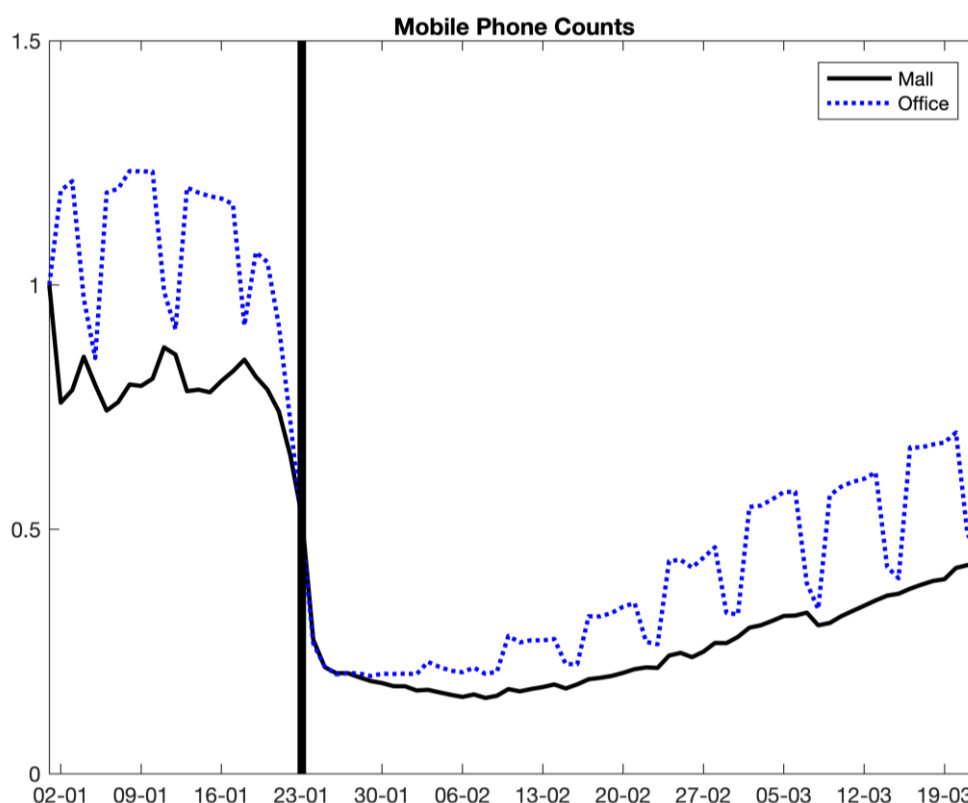


Figure 5: Location in Office Buildings and Shopping Malls plots cross the average of visits to shopping malls (solid line) and office buildings (dotted line) across Chinese cities in the past three months, after normalizing the number of people in a location to 1 on January 2, 2020. Again, the black vertical line denotes the date of the lockdown in Wuhan.

Adjustments to consumption were also swift and sizable. The official data shows that total retail sales of consumption goods dropped by 21% in January and February from a year earlier. The food service income fell by 43%, which is consistent with the equally dramatic decline of visits to shopping malls in Figure 5.

To gain more understanding of the consumption response to the lockdown, we further obtain monthly sales data by product category from a major online platform in China. Panel A of Figure 6



shows a dramatic shrink of digital and electronic goods sales in January and February, which used to account for two thirds of total sales from the platform before the lockdown. The adjustment was striking in Hubei, where more than two thirds of digital and electronic goods sales evaporated in January and February. Panel B shows the flip side of the shift. Groceries now account for more than 35 and 23 percent of total sales in and outside Hubei, respectively.

Figure 6: Online Sales Shares by Product Category

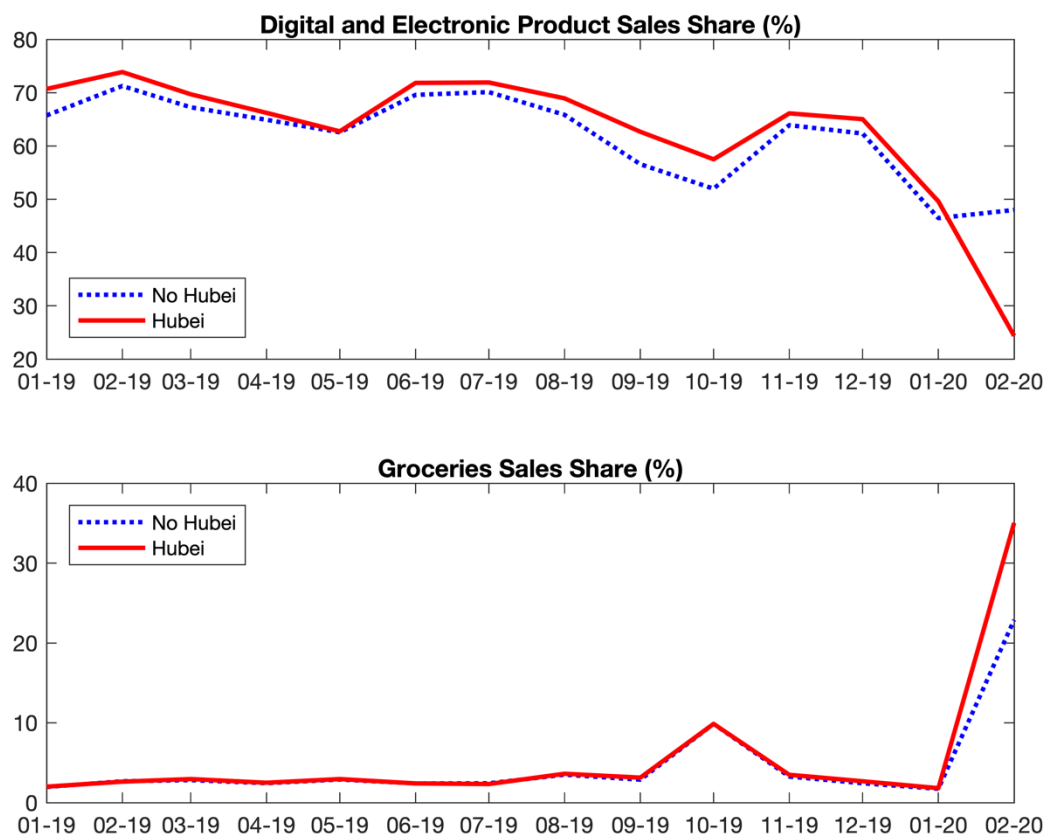


Figure 6: Online Sales Shares by Product Category plots monthly digital and electronic goods sales share (Panel A) and groceries sales share (Panel B) on a year-on-year basis. The solid and dotted lines represent sales in and outside Hubei, respectively. The data is provided by a major online sales platform in China.

In sum, the economic impact of lockdown on China is large, severe, and perhaps is still mounting. While flows of people and goods outside Hubei have come back to their pre-lockdown levels, the recovery was sluggish in the economic activities involving face-to-face interactions. The top authorities in Beijing are rolling out various massive economic and financial policies in a timely fashion. Nevertheless, at this point, China is still facing a daunting challenge for its economic recovery. The deteriorating pandemic situation across the globe is bringing an almost complete halt to the export sector in China, and could make it difficult for Chinese firms to access critical inputs provided by firms outside of China.



Chong-En Bai

Co-Director

baichn@sem.tsinghua.edu.cn

Zheng Michael Song

Co-Director

zsong@cuhk.edu.hk

The Chinese University of Hong Kong – Tsinghua University Joint Research Center for Chinese Economy

9/F, Esther Lee Building, The Chinese University of Hong Kong, Shatin, Hong Kong

<http://research-center.econ.cuhk.edu.hk>

Email: CT-CCE@cuhk.edu.hk

Tel: +852 3943 5423

Related Reports

- (1) [Preliminary Estimates of Economic Effect of Lockdown in China](#)