

Economic impact of 2019-nCoV

Returned to work? Observations from travel data

As time goes on, the outbreak of coronavirus started to erode economic activities in real numbers. In this report, we turn to high-frequency travel and migration data, at national level and for selected cities, to shed some light on how many people have returned. We find that return trip during the post-CNY window (25 Jan-8 Feb) has decreased roughly to a magnitude of 60-80% compared to the same period last year. This finding conveys warnings. 1) Work suspension could be more severe than expected. We estimate that nationwide, only 20 - 40% of production capacity is able to resume by this week; 2) Major cities will continue to be exposed to coronavirus risks because more people are returning in upcoming days. It could be a long and onerous fight against the 2019-nCoV.

- **How many people have returned? Finding #1: Nationwide travel declined 82% YoY after the CNY, measured by passengers carried.** By means of transportation, railway dropped 79% while civil aviation decreased 70%. Before the CNY, travel demand seemed normal, with passengers carried increasing 2% YoY pooling all means of transportation.
- **Finding #2: At city level, migration inflow decreased 68% YoY after the CNY.** We conduct analysis on 10 selected cities that are migration-intensive and economically important, including Beijing, Shanghai, Guangzhou, Shenzhen, Chengdu, Dongguan, Suzhou, Foshan, Changsha and Chongqing. On average, migration inflow declined 68% YoY after the CNY. During the past weekend, however, migration inflow picked up meaningfully and DoD growth on 8 Feb and 9 Feb exceeded 20% for Guangzhou, Shenzhen, Dongguan, Foshan and Changsha.
- **What does travel data inform us? 1) Return peak has not come yet for most cities.** Compared to previous years, we estimate that 60-80% of the return trips have been delayed; **2) Work suspension may extend beyond this week,** weighing on economic activities. We estimate that only 20% to 40% of the production could resume by this week. Stay cautious when analyzing production activities which rely on a large volume of migrant employees; **3) Fighting the coronavirus is onerous** as cities are expecting larger inflows of population in the future. It is very necessary to adopt flexible back-to-work schedule to avoid contagion.
- **A few more thoughts.** For investors, hold reverence for both markets and life. Better realize that the coronavirus is a tough fight in the short term while thinking about what deserves efforts in the long run. To the extent that the crisis will trigger reform and reflection on the governance system and arouse public health awareness per se, there is no reason to be pessimistic. For all individuals experiencing the outbreak, stay safe, healthy and positive as much as we can. Be prepared to embrace a productive and all-round recovery.

Data Summary

YoY, passengers carried	Overall	Railway	Civil aviation	Highway
Pre-CNY (10 Jan 2020 - 24 Jan 2020)	2.0%	17.2%	6.7%	-0.5%
Post-CNY (25 Jan 2020 - 8 Feb 2020)	-81.5%	-79.2%	-70.1%	-82.2%

Source: Ministry of Transportation, CMBIS

Ding Wenjie, PhD

(852) 3900 0856 /

(86) 755 2367 5597

dingwenjie@cmbi.com.hk

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How many people have returned?

We turn to high-frequency real-time travel data to provide some clues.

Data 1: Passengers carried (nationwide)

We first analyze official data on passengers carried by various means of transportation. Ministry of Transportation provide such data on a daily frequency during the Chinese New Year Travel Rush (春运). We identify two periods. i) pre-CNY, which starts from the onset of CNY Travel Rush to 24 Jan 2020 (the last lunar calendar day of 2019); and ii) post-CNY, which starts from 25 Jan 2020 (the first lunar calendar day of 2020) to 8 Feb 2020.

We estimate around 60-80% return trips were delayed

In the pre-CNY period, traffic data looks quite normal compared to previous years'. People were going back home to observe the traditional holiday. Passengers carried increased 2.0% YoY overall. Across different means of transportation, railway passengers increased 17.2% YoY, civil aviation 6.7% while highway -0.5%.

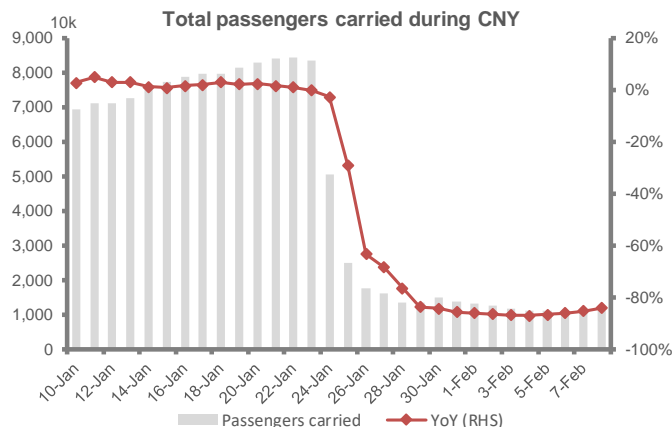
With the outbreak of 2019n-CoV, travel demand shrank abruptly and supply was severely restricted. As a response to extended holidays thus delayed back-to-work schedules, the post-CNY period (25 Jan – 8 Feb) witnessed an overall ~82% drop in passengers carried compared to the same lunar calendar period last year. Across the spectrum of transportation means, the magnitude of post-CNY YoY decline fell in the range of 70% to 82% (railway -79.2%, civil aviation -70.1%, highway -82.2%).

Let's try to use the above travel data to infer back-to-work status of "migrant employees", who traveled to another city during the CNY and need to travel back to work. At the national level, we estimate that **around 60-80% of the return trips were delayed**. It is likely that 60-80% "migrant employees" have not returned to their work destination yet.

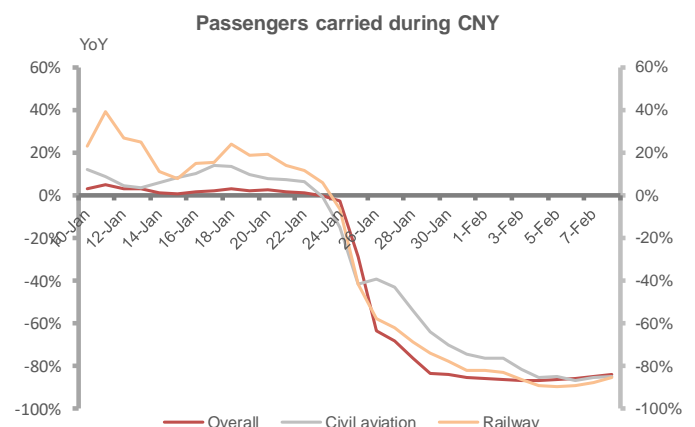
Figure 1: Passengers carried declined 79.2%/70.1% YoY since 25 Jan to 8 Feb

YoY, passengers carried	Overall	Railway	Civil aviation	Highway
Pre-CNY (10 Jan 2020 - 24 Jan 2020)	2.0%	17.2%	6.7%	-0.5%
Post-CNY (25 Jan 2020 - 8 Feb 2020)	-81.5%	-79.2%	-70.1%	-82.2%

Source: Ministry of Transportation, CMBIS

Figure 2: Passengers carried declined abruptly after the first lunar calendar day of 2020 (25 Jan)


Source: Ministry of Transportation, CMBIS

Figure 3: Passengers carried by means of transportation


Source: Ministry of Transportation, CMBIS

Data 2: Migration index (for selected cities)

City-level Migration index. We also look at the migration index published by Baidu Map, which measures the number of population flowing out and into cities and then indexed to be comparable between different cities. In charts below, we plot migration *outflow index* before the CNY and *inflow index* after the CNY for 10 selected cities.

These cities are 1) intensive in population migration, 2) economically important, and 3) have relatively high proportions of non-Hukou residents (this part of population tend to travel back to hometowns during the CNY break and return to work thereafter).

Our preliminary findings are as follows, based on data available up till 8 Feb 2020,

- 1) **Pre-CNY migration outflow increased 16% on average.**
- 2) **Post-CNY migration inflow decreased 68% on average.**

Story behind the data is simple. People went back to home towns for the CNY, as usual, but many of them have not come back yet due to the coronavirus outbreak. Trends of city-level migration index are also consistent with national-level data on passengers carried published by the Ministry of Transportation (Figure 1).

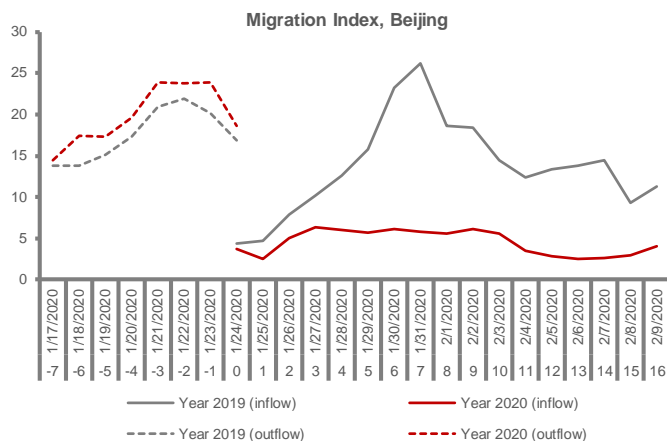
- 3) **... however, migration inflow was picking up during the past weekend.** DoD change of migration inflow index on 8 Feb and 9 Feb exceeded 20% for two consecutive days for Guangzhou, Shenzhen, Dongguan, Foshan and Changsha. It is likely that part of the “migrant population” is returning to their work places before 10 Feb 2020, i.e. the previously stipulated back-to-work date according to provincial governments.

Figure 4: Migration index of selected cities – Inflow population after the CNY declined 69% on average

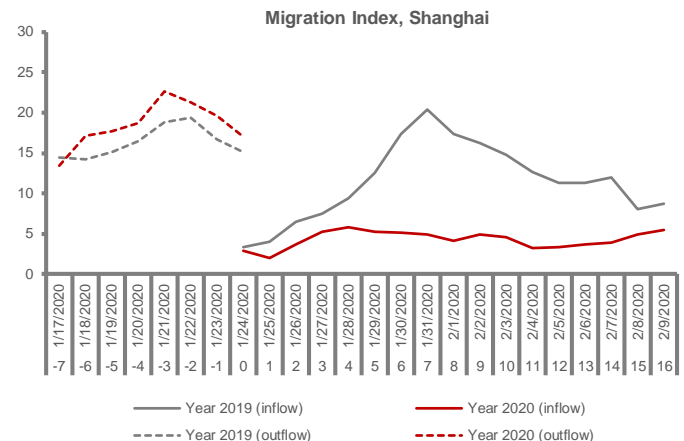
	YoY change of Migration Index		DoD change		% of non-Hukou residents as of 2018	# of confirmed cases
	17 Jan - 24 Jan (Outflow)	25 Jan - 8 Feb (Inflow)	8 Feb vs. 7 Feb	9 Feb vs. 8 Feb		
Beijing	14%	-68%	12%	40%	36%	326
Shanghai	13%	-63%	23%	13%	40%	293
Guangzhou	17%	-71%	25%	33%	38%	307
Shenzhen	20%	-67%	30%	20%	65%	366
Chengdu	16%	-61%	3%	-1%	10%	120
Dongguan	28%	-66%	51%	35%	72%	58
Suzhou	13%	-69%	40%	-12%	34%	75
Foshan	21%	-73%	24%	25%	45%	67
Changsha	14%	-67%	50%	73%	10%	205
Chongqing	10%	-71%	-6%	2%	23%	468
Average	16%	-68%	25%	23%	37%	39,837 (Whole nation)
Wuhan	7%	-95%	-6%	-6%	20%	16,902

Source: Baidu Map, Wind, www.dxy.cn, CMBIS

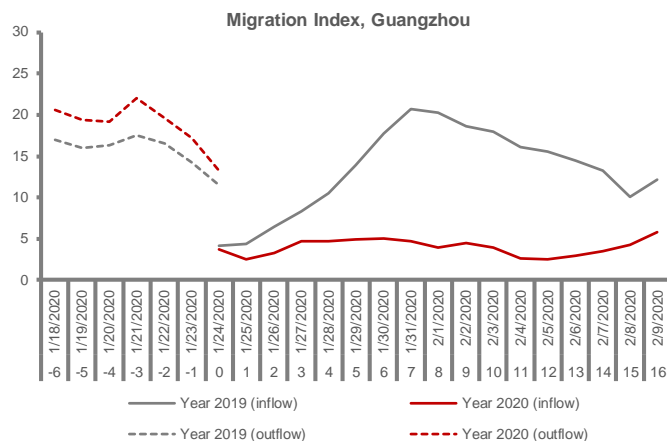
Note: Cities in no particular order. # of confirmed cases up till 10 Feb 2020, 7:41.

Figure 5: Migration index - Beijing

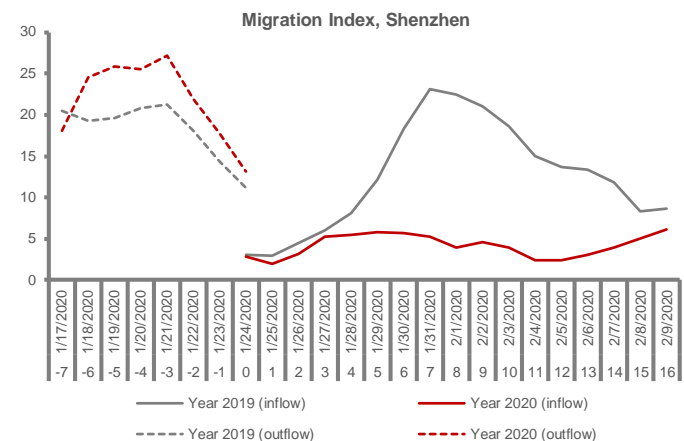
Source: Baidu, CMBIS

Figure 6: Migration index - Shanghai

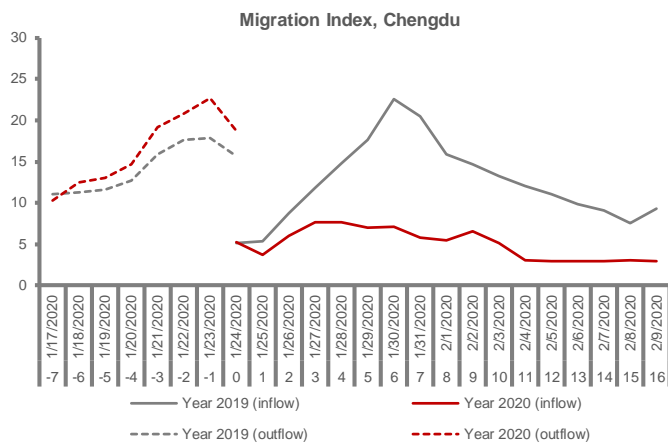
Source: Baidu, CMBIS

Figure 7: Migration index - Guangzhou

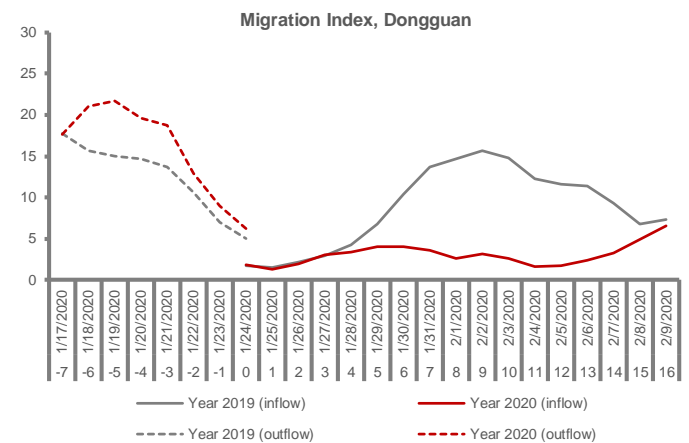
Source: Baidu, CMBIS

Figure 8: Migration index - Shenzhen

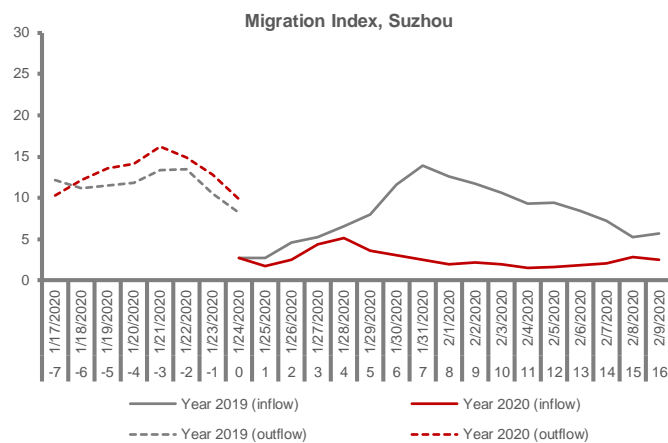
Source: Baidu, CMBIS

Figure 9: Migration index - Chengdu

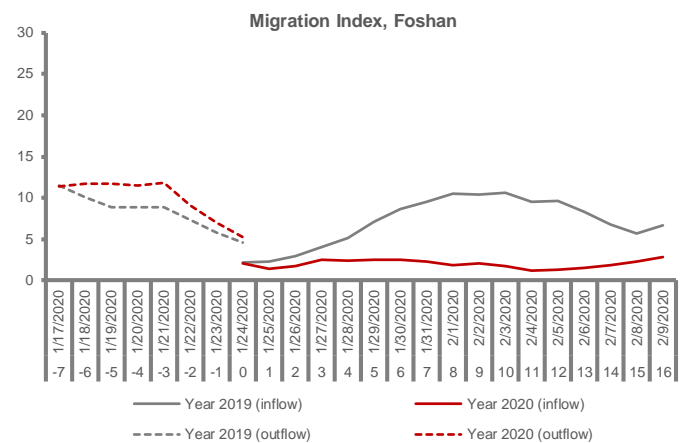
Source: Baidu, CMBIS

Figure 10: Migration index - Dongguan

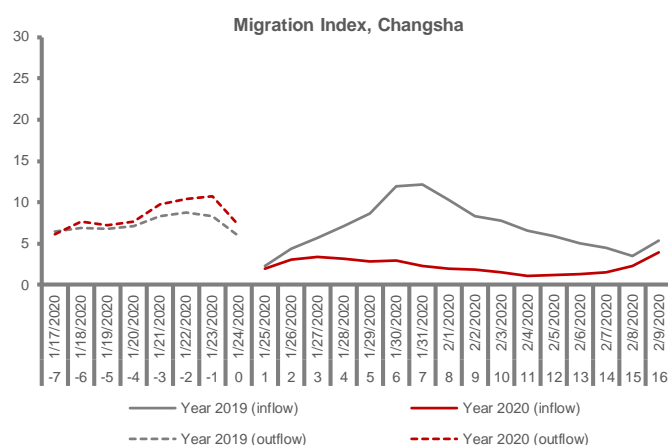
Source: Baidu, CMBIS

Figure 11: Migration index - Suzhou

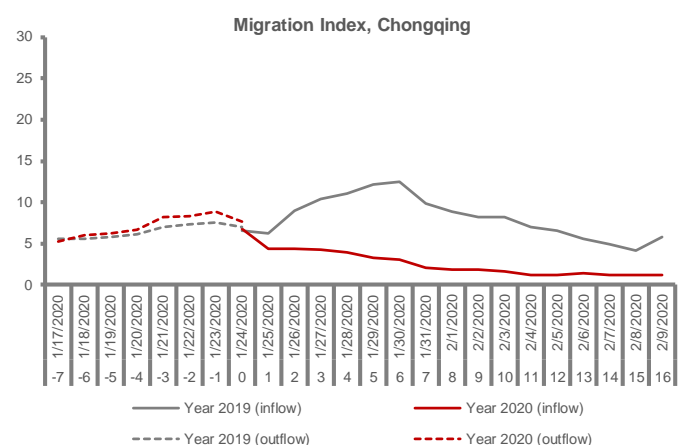
Source: Baidu, CMBIS

Figure 12: Migration index - Foshan

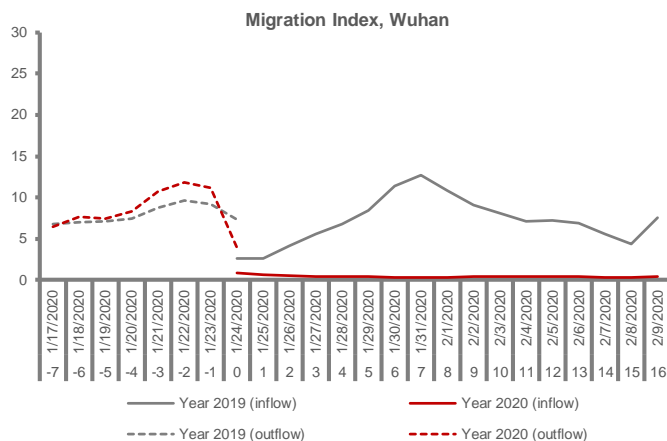
Source: Baidu, CMBIS

Figure 13: Migration index - Changsha

Source: Baidu, CMBIS

Figure 14: Migration index - Chongqing

Source: Baidu, CMBIS

Figure 15: Migration index - Wuhan

Source: Baidu, CMBIS

What does travel data inform us?

- 1) The return peak has not come yet for most cities.** In normal years, the CNY return peak usually occurs around the 7th day of lunar new year, when official CNY holiday ends. This year, the return peak has just not come yet for the cities we are observing due to postponed back-to-work schedule in response to coronavirus outbreak.
- 2) Work suspension may continue.** We suspect work suspension may turn out to be more severe than expected because the majority of workers have not returned yet. Economic growth will further be weighed on.
- 3) This finding is alerting to the extent that cities, even outside Hubei, will continue to be exposed to great coronavirus risks** – residents are still on the way back. An increasing inflow of population will render cities vulnerable.

Caveats. Using travel data to infer back-to-work status may have some caveats. For example, not all travel during the post-CNY period carry the purpose of “returning to workplace”. Some could be business travel or leisure travel. That said, we might be exaggerating the extent of return trip delay this year.

Work resume policies and practice

Flexible work schedule. Suspension likely to continue. Many local governments have urged corporates to adopt flexible plans, such as arranging employees on duty on a rolling basis and resuming work or production in batches. A quarantine period is required for employees coming back from outside provinces or cities.

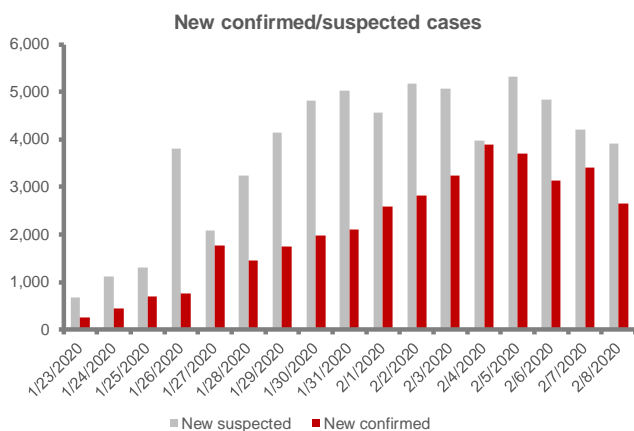
High standards to meet before resume production. Firms are also required to meet government's standards for public health conditions before they resume production. For example, they must have enough supplies of face masks, disinfectant, thermometers, and stringent measures to prevent coronavirus risks.

Other monitors

Statistics on 2019-nCoV outbreak

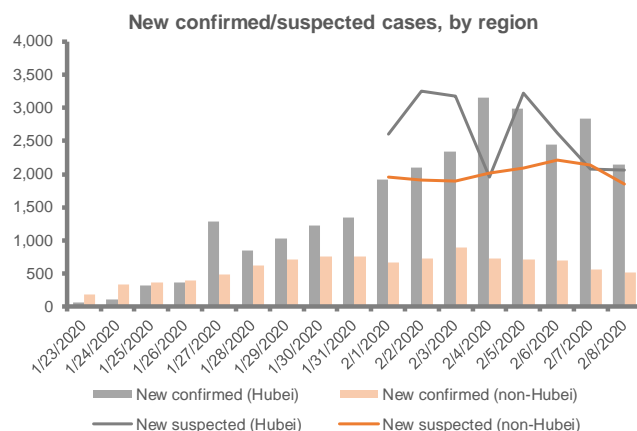
Although statistics on new confirmed and suspected cases pointed to a better trend, experts are cautious from drawing conclusion about inflection point. Still a tough road ahead for both Hubei and non-Hubei area.

Figure 16: New confirmed and suspected cases



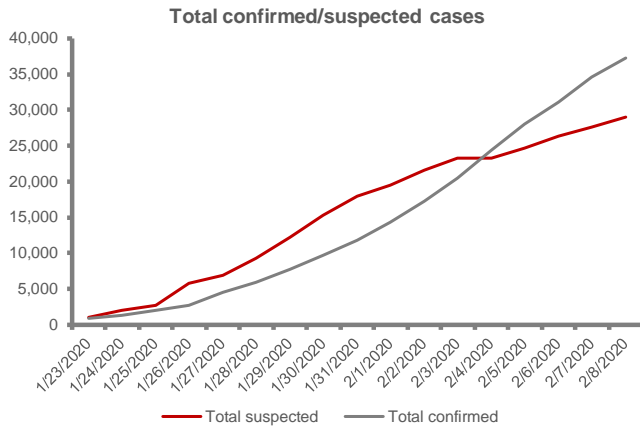
Source: NHC, CMBIS

Figure 17: New confirmed/suspected cases declined DoD for both Hubei and non-Hubei area



Source: NHC, CMBIS

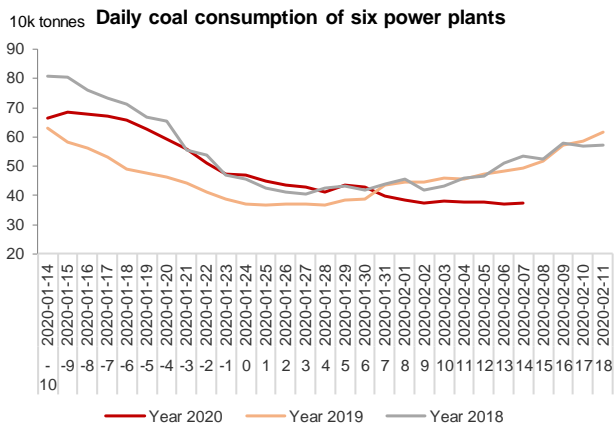
Figure 18: Cumulative curve of confirmed and suspected cases



Source: NHC, CMBIS

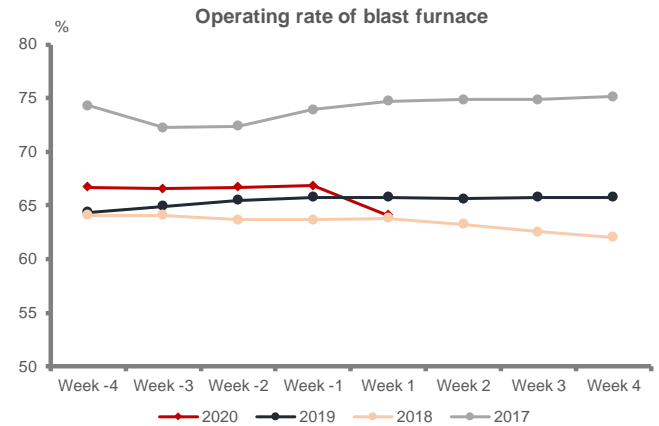
High-frequency monitors on industrial activities

Figure 19: Daily coal consumption deviated from “normal” trends and levels



Source: Wind, CMBIS

Figure 20: Blast furnace operating rate dropped in the 1st week after CNY



Source: Wind, CMBIS.

Note: “Week 1” denotes the 1st week after the CNY break, whereas “Week -1” denotes 1 week before the CNY.

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