DISCUSSION PAPER SERIES

COVID-19 感染に関する統計分析と政策提言
その５

An Analysis of the Balance between Epidemic Prevention of COVID-19 and Economic Revitalization in Japan in 2020

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Abstract

In the pandemic of new coronavirus (henceforth COVID-19), a contagious disease caused by SARS-CoV-2, the whole world is changed and left in chaos. Medical systems are overwhelmed, and world economies are suffering from the big hit, Japan has no exception. Since the beginning of the outbreak of COVID-19, Japan has been trying hard to control the spread of the coronavirus and at the same time to recover its domestic economy influenced by the pandemic. This paper reveals that the current COVID-19 disease control in Japan is not optimistic and far from sufficiency. On one hand, the maintaining high positivity rate of polymerase chain reaction (PCR) test explains the insufficient PCR tests performed among the population and suggests that the disease might be already out of control in Japan especially in the highly populated metropolitan areas. On the other hand, the government subsidy program "Go To Campaign" at the beginning of the second COVID wave in Japan, aiming at calling the demand of domestic consumption in the tourism and hospitality sectors, is evaluated as the catalyst of a third COVID wave. Hundreds of people who participated in and working at this program have been confirmed as COVID infected. As policy implications, this paper suggests that disease control should be the first priority in order to reduce the holistic costs on the society.

Keywords: coronavirus, COVID-19, Go To Campaign, policies, Japan

1. Introduction

Since the outbreak of the coronavirus disease 2019 globally, a contagious disease caused by SARS-CoV-2, the world is left in chaos. Many nations and economies are facing huge difficulties in looking for optimal solutions to the prevention of further spread of COVID-19. By the end of 2020, more than a whole year past since the first COVID-19 case been confirmed, the total confirmed cases in the world has exceeded 80 million while the total number of confirmed deaths is reaching 2 million people in more than 200 countries, regions or territories with cases (World Health Organization, 2020). As a result, in this entire year, the COVID-19 influenced not only the medical conditions but also the entire economic systems in the changed world.

Restrictions on human's movement like lockdown, closure of national borders and the like in order to prevent the spread of virus totally changed human's behaviour and have had huge impacts on social and economic activities. The COVID-19 recession is estimated as the most rapid and sharpest degradation among all global recessions from the 1990s and the damage will last for a long time period (World Bank, 2020). Therefore, many economies are trying their best bus also struggling with how to balance the spread of virus and social economic activities at the same time.

This paper is going to choose Japan, one of the Organization for Economic Co-operation and Development (OECD) member countries, as the focus for analyses and discussion. During the past year, comments or reviews of Japan's responses to the epidemic of COVID-19 have been mixed and ambiguous, especially in the early stages. This paper aims at showing a clearer picture of Japanese domestic anti-epidemic environments and how it is balancing the epidemic prevention and economic revitalization at the same time from the beginning of COVID-19 to the end of 2020, combining with the explanations of relevant policies and countermeasures.

2. COIVD-19 Context in Japan

2.1 Overview

In Japan, the first case of COVID-19 was confirmed in the middle of January 2020, carried by a foreigner coming back from Wuhan, the city where the virus was originally found and then spread out rampantly (Sim, 2020). After that, *Diamond Princess*, the cruise ship returned to and anchored off the pier in Yokohama Port on 3 February, attracted huge attentions form all over the world because of the rapid spread of the new coronavirus and the sudden quarantine in the close confines (Mallapaty, 2020). Meanwhile, the criticism over Japanese disease control also stared since then because the situations were chaotic and the inspections were far from efficient ('Coronavirus: Passengers leave Diamond Princess amid criticism of Japan', 2020). However, it seemed that Japan didn't learn much lessons from the *Princess Diamond* incident which was considered as a good study example of the behaviours of the new coronavirus (Mallapaty, 2020). Therefore, soon after the disembarkation of all passengers and crew members from the *Princess Diamond* cruise ship on 1 March, the real outbreak of COVID-19 started in Japan drastically just like any other country in the rest of the world ('All passengers and crew leave virus-hit Diamond Princess cruise ship', 2020).

During the past year, the trend of COVID-19 in Japan experienced ups and downs in different periods of time. Until the end of 2020 (as of 31 December 2020), the number of daily new infections reached 3,845, accumulative infections exceeded 220,000 with 34,166 active cases of and 3,413 deaths in total (Ministry of Health, Labour and Welfare, 2020).

2.2 Main monitoring items

Currently, there are 6 main items being monitored by the Japanese government to capture the general situations of the COVID-19 epidemic (domestic cases[1]) which are 1) number of polymerase chain reaction (PCR) tests performed, 2) number of persons tested positive, 3) number of persons requiring inpatient treatment, 4) number of persons requiring inpatient treatment of which the number of seriously ill, 5) number of persons discharged or released from care, and 6) number of deaths (Ministry of Health, Labour and Welfare, n.d.). This study selected 3 most important monitoring items (i.e., daily number of new infections; daily number of PCR tests performed; and daily positive rate of PCR tests performed, including their rolling 7-day average values)[2] and did some calculations to analyse the severe situations in Japan against the coronavirus.

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[1] The domestic cases do not include the number of cases from airport quarantine which have been published by the municipal governments.

[2] The number of new positive cases on each reporting date is calculated by accumulating the number of individual cases (including re-positive cases) that each municipal authority presses releases, and may therefore differ from the total number of cases on the previous day.

Daily Number of New Infections

As the trend of Japanese domestic daily infection of COVID-19 shown in *Figure 1*, three waves of the COVID-19 daily infections in which the third one is ongoing can be observed from the curve of rolling 7-day average since the beginning of the outbreak from middle January. The daily number of new infections in each turned out to be much higher and larger than the previous one. At the same time, the time period of each wave turned out to be longer than ever before. As shown in *Figure 2*, the contribution of each prefecture in Japan to the daily number of new infections can be seen. The larger coloured area the prefecture accounts, the more cases it contributed to the whole nation. It is not difficult to find out that most of the new COVID-19 cases happened in metropolitan areas including the capital zones like Tokyo, Chiba, Saitama & Kanagawa, and Osaka due to the high density and mobility of its population. The correlation coefficient of domestic daily new infection of COVID-19 between Japan and the top 10 prefectures with the most daily new cases in 2020 was calculated in *Table 1*. The results show that the prefectures which are close to the capital city Tokyo, namely the heart of Japan, had a more similar trend to the whole nation and contributed more to the total cases compared to other regions. The trends in the status of COVID-19 infection in six main prefectures (Tokyo, Osaka, Kanagawa, Hokkaido, Hyogo and Fukuoka) are presented in *Appendix*.

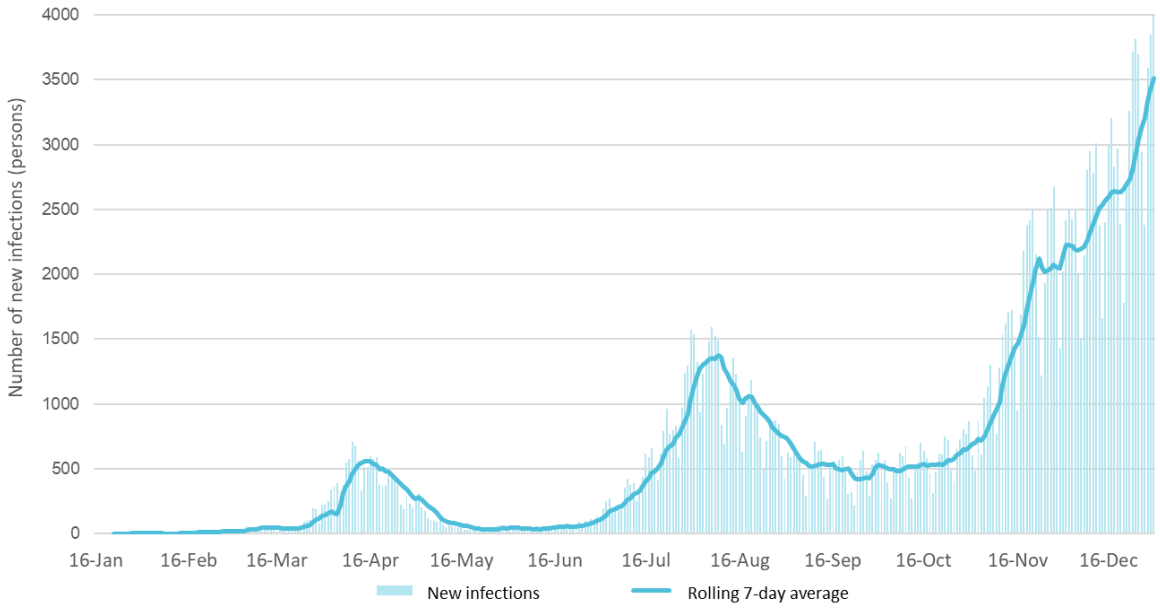


Figure 1 The trend of Japanese domestic daily new infection of COVID-19 in 2020. Compiled from Ministry of Health, Labour and Welfare (2020).

The first wave of COVID-19 started around March and ended at the end of May. The peak value reached 590 new infections per day on 18 April, two days after the declaration of "State of Emergency" national wide on 16 April (Ministry of Health, Labour and Welfare, 2020–2021). The

valley value dropped to 20 new infections per day domestically on 25 May, and a week later the “State of Emergency” finished on 31 May which was supposed to be relieved 25 days earlier on 6 May as originally planned (`Kinkyu jitai sengen' zenkoku kakudai `tokutei keikai' 13 todofuken shingata korona ["State of Emergency" nationwide expansion "Specific Alert" in 13 prefectures for new coronavirus], 2020).

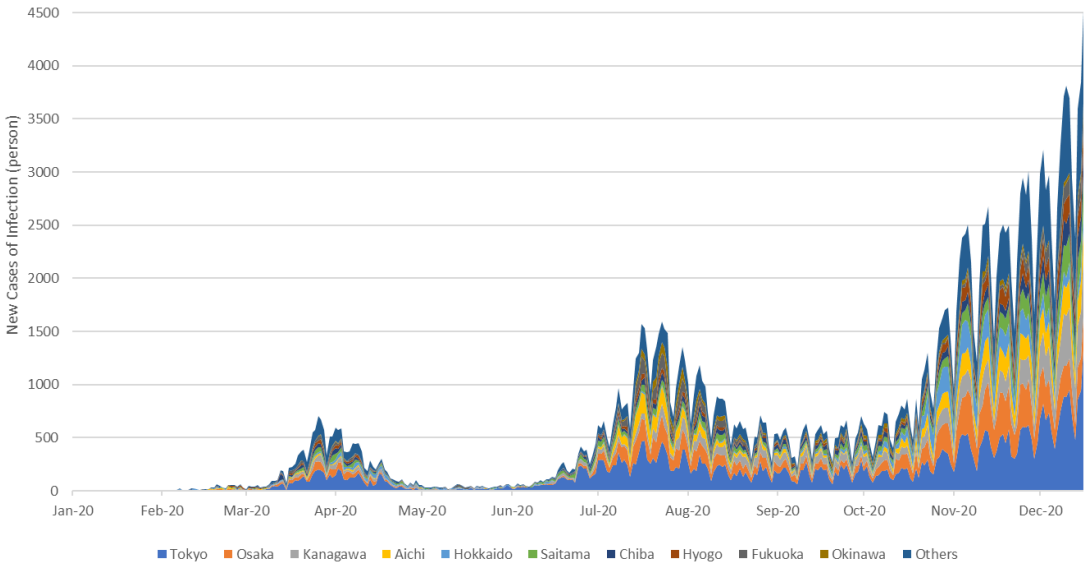


Figure 2 The trend of Japanese domestic daily new infection of COVID-19 by prefecture in 2020. Compiled from TBS News (2020).

Table 1 The correlation coefficient of domestic daily new infection of COVID-19 between Japan and the top 10 prefectures with the most daily new cases in 2020

Japan-Tokyo	Japan-Chiba	Japan-Hyogo	Japan-Saitama	Japan-Aichi
0.97	0.95	0.91	0.90	0.87
Japan-Osaka	Japan-Kanagawa	Japan-Hokkaido	Japan-Fukuoka	Japan-Okinawa
0.87	0.81	0.77	0.75	0.70

The second wave of COVID-19 started in the middle of June, within half a month after the end of the declaration of “State of Emergency”, until October. During this wave, the peak value reached 1595 new infections per day domestically on 7 August which was almost three times higher than the peak value of the first wave. Meanwhile, the valley value of the second wave was 216 new infections per day which was almost 100 times as the one in the first wave (Ministry of Health, Labour and Welfare, 2020–2021). Although the number of daily infections grew much faster than the first wave, there was no declaration of “State of Emergency” national wide like before.

When the second wave of COVID-19 seemed not to subside, the third wave as well as a rather severer one started from the early October right after. During the third wave, the daily number of new infections is increasing steadily and more rapidly. The current peak value of the third wave is 4520 new infections per day on 31 December, breaking the record of daily new confirmed cases, which is 8 times higher than the first peak and 3 times higher than the second one (Ministry of Health, Labour and Welfare, 2020–2021). However, the trend seems not to stop but continue keeping rising by a higher speed in the coming days. There is an interesting finding that the trend of three COVID waves also happened other regions such as the USA (see *Figure 3*). The correlation coefficient between the number of new positive cases in Japan and the USA (7-day moving average) exceeded 0.9, showing an extremely high correlation between these two nations.

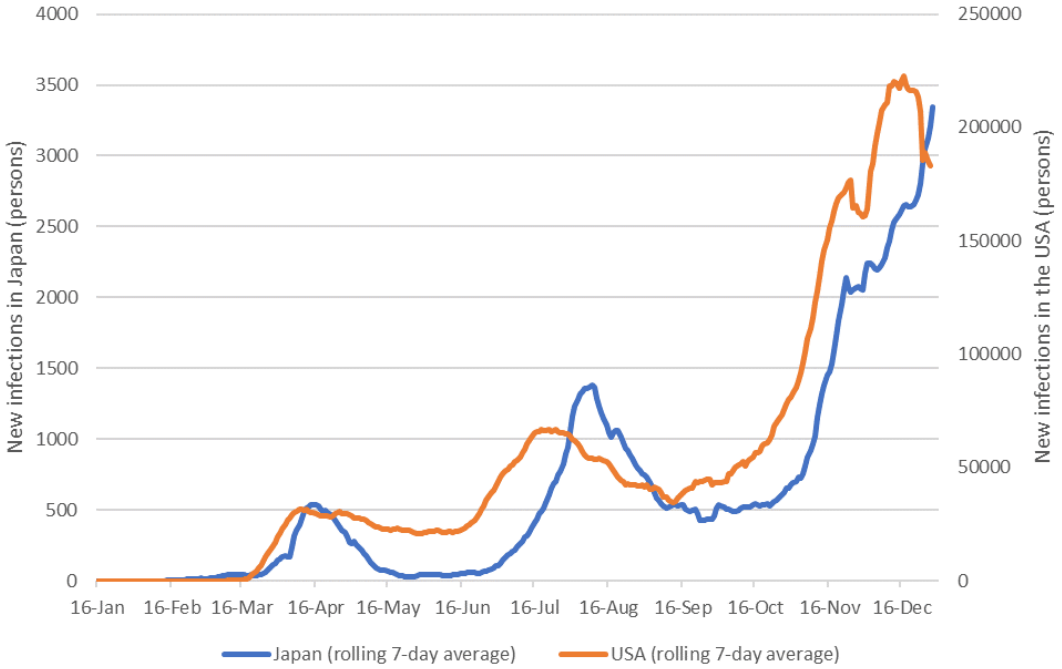


Figure 3 The trend of new infections (rolling 7-day average) in Japan and the USA in 2020. Compiled from Ministry of Health, Labour and Welfare (2020) & New York Times (2020).

Daily Number of PCR Tests Performed

The number of daily new infections of COVID-19 is based on the daily number of PCR tests performed because the number of new confirmed cases are the one of persons who tested positive in PRC inspection. *Figure 4* indicates the trend of daily number of PCR tests performed (rolling 7-day average) in addition to *Figure 1*. Compared to the curve of daily new confirmed cases (rolling 7-day average), two trends (the grey and orange lines in *Figure 4*) are surprisingly similar to each other. The curve of PCR tests performed also presents three waves like the one of daily new confirmed cases (rolling 7-day average).

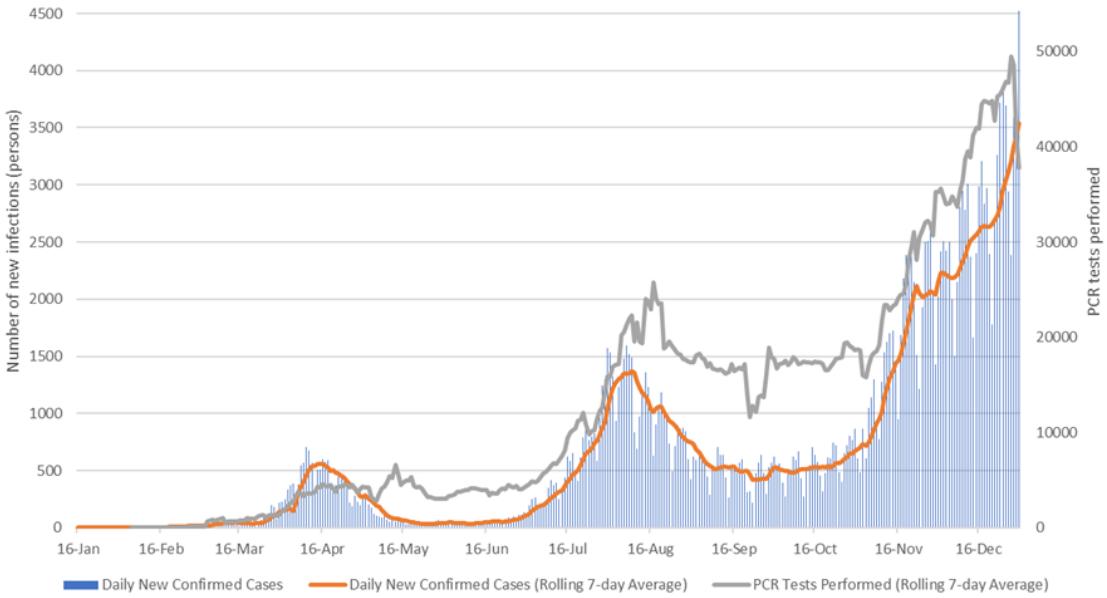


Figure 4 The trend of daily number of new infections and PCR tests performed in Japan in 2020. Compiled from Ministry of Health, Labour and Welfare (2020).

To examine the relationship between the daily number of new infections and the daily number of PCR tests performed, the correlation coefficient of two sets of data was calculated. The correlation coefficient between these two monitoring items and rolling 7-day average of the two items are 0.78 and 0.95 respectively, determining that the two sets of data have relatively high positive correlation. Thus, one hypothesis can be developed that the daily number of PRC tests performed can determine the daily number of new infections to a large extent. In addition, the three waves of daily new infections are actually the fluctuation of daily PCR tests performed. Based on the data and statistical analyses, as long as the daily number of PCR tests performed keeps rising , the daily number of new infections will also go up, and vice versa.

One reason to explain the high correlation between the daily number of new infections and the daily number of PCR tests performed is the lack of PCR tests and inspections. In the early stage (the first wave), due to the low capacity of PCR tests and high expenses of inspection, the number of PCR tested performed kept low compare to other countries like Korea which firstly implemented different types of large-scale PCR tests across the country. From the second wave, the number of PCR tests have been increasing along with the open for private inspection agency but is still not enough. At the moment, 72,258 is the largest number for daily PCR tests performed which is still far from the maximum capacity of inspection (112,953 PCR tests/day) published by the government (Ministry of Health, Labour and Welfare, 2020-2021).

Daily Positive Rate of PCR Tests Performed

Daily positive rate of PCR tests performed is the ratio of daily number of new infections, namely daily new positive cases (rolling 7-day average) to daily number of PCR tests performed (rolling 7-day average). *Figure 5* demonstrates the trend of daily positive rate of PCR tests performed (rolling 7-day average) in addition to *Figure 4*. The curve of daily positive rate of PCR tests performed (yellow line in *Figure 5*) shows a totally different shape with the ones of daily new confirmed cases (rolling 7-day average) and daily number of PCR tests performed (rolling 7-day average).

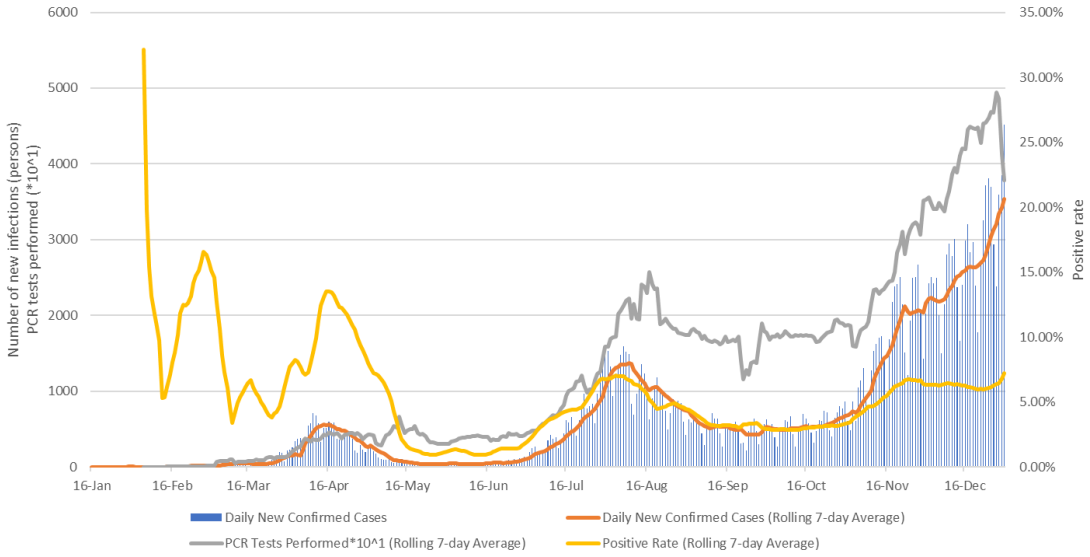


Figure 5 The trend of daily number of new infections, PCR tests performed and positve rate of PCR tests performed in Japan in 2020. Compiled from Ministry of Health, Labour and Welfare (2020).

In the early stage until the dismiss of declaration of “State of Emergency”, the positive rate experienced great fluctuation because of the limited PCR tests and inspection systems. During that time, only people who were recognized as the close contacts of infected population and received and contacted by the local public health centres After that, it reached the peak during July and August and keeps steady in the range from 3% to 8%. But recently from middle December there is a trend that the positive rate will keep rising.

2.3 Summary

Based on the preliminary analyses, the current situations of COVID-19 in Japan (domestic cases) are not optimistic. First, the number of new confirmed cases is increasing drastically every day without a stop especially within the recent two months. Behind the rising numbers, a more reliable and objective indicator, positive rate of PCR tests performed, keeps stable above 5% which is the

maximum recommended positivity suggested by the World Health Organization (Johns Hopkins University & Medicine, 2021). The relatively high positivity rate can well explain that the government is not testing enough epidemic population besides the sickest patients who are seeking for medical assistance.

Therefore, two main policy implications and suggestions can be made here. First, the government should spare no effort to enhance the PRC testing of coronavirus. Currently, the country is not doing its best (only 60% of its maximum inspection capacity per day) in the inspections and most of the monitoring items are still ambiguous which can be regarded as a system with "self-deception". Only when the test sample is large enough, the government can recognize the real positivity rate and potential infected population. Second, the authorities should reconsider about how to deliver COVID-19 related information to the public audience in a better and more alarming way. For example, the positivity rate is barely mentioned in the mass media in Japan so only a little population may have the knowledge of it. But the positivity rate is a significant indicator to exam whether the PCR inspection is enough or not, and whether the new coronavirus is under control in the region or not. The World Health Organization also announced the guideline that a region is recommended to implement strict measures of social distancing and others especially when the positivity rate exceeds 5%, like now in Japan (Johns Hopkins University & Medicine, 2021). The publicity and knowledge of information can always be essential for people's behaviours under this pandemic.

3. Economic Stimulation –"Go To" Policies under COVID-19

In the worldwide pandemic of COVID-19, many economies are suffering from heavy

pressure due to the constraints of human behaviour and social activities, and Japan has no exception. In FY2020, Japan's real GDP growth rate (year-on-year) declined by 5.3% as estimated and domestic private consumption dropped by around 20% (OECD, 2020; Kuroda, 2020). As a country which the services sector accounts for the majority of its GDP (68.7%) and labour force (70.9%), Japan is facing severe economic recession especially in the tourism and hospitality industries due to the sharp decline in inbound travellers (Central Intelligence Agency, 2020; Japan National Tourism Organization, 2020). Thus, the government started to look for ways to call domestic consumption in order to revive the economy. This chapter will introduce the measures Japanese government took in response to the declining economy, briefly evaluate the measures, and finally give several policy implications.

3.1 Japan's "Go To" Policies

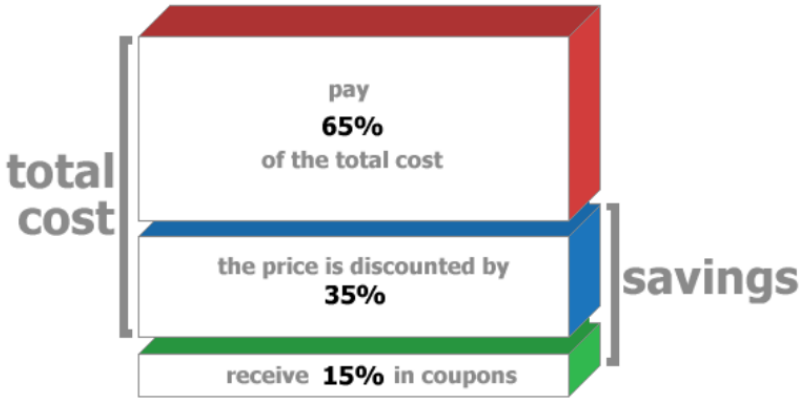
Japanese government initiated a scheme called "Go To" from 22 July 2020, soon after the end of nationwide "State of Emergency". The "Go To" campaign aimed at stimulating and stabilizing domestic demands for tourism and hospitality sectors. Two main programs were included in the campaign: 1) "Go To Travel" starting from 22 July, with a 35% discount subsidized by the government for anyone in Japan who purchased the traveling products and accommodation, and an extra coupon equivalent to 15% of the total trip price to be used in the local stores was added from 1 October (see *Figure 6*); and 2) "Go To Eat" starting from 1 October, with one track of 25% discount meal coupons for using in restaurants (namely paying 10,000 yen can get 12,500-yen vouchers) and another track of gaining extra points via online reservation system which can be used as cash in next reservation (Japan Tourism Agency, 2020; Ministry of Agriculture, Forestry and Fisheries, 2020). According to the estimation by Japan Tourism Agency (2020), at least 68.5 million person-nights of travellers and stays and subsidies of approximately 406.3 billion yen were recorded from July to November.

3.2 Brief evaluation of the "Go To" policies

After the launch of "Go To", different voices can be heard from the public. On one hand, an increase in domestic travellers can be observed in various tourist destinations, boosting many local economies and business thanks to "Go To Travel". On the other hand, with the implementation of both "Go To Travel" and "Go To Eat" from October, the number of daily new infections also started to grow rapidly again, leading Japan to a third COVID wave. Some criticism blaming the new COVID wave on the "Go To Campaign" also came out on mass media. At the moment, the "Go To Campaign" is being suspended nationwide from 28 December because the outbreak of coronavirus is out of control (The Asahi Shimbun, 2020). Until now, although there's still no evidence proving that "Go To Campaign" is the direct cause of the third COVID wave, yet the implementation of "Go To" policies

can be evaluated to be inappropriate as a catalyst for the outbreak of coronavirus from the following points.

Figure 6 "Go To Travel" scheme explained. Graph from 'Go To Travel' explained. (2021, February 3). Retrieved from https://www.japan-guide.com/news/0053.html



Example

- A couple books an overnight trip costing 40,000 yen
- They receive a 14,000 yen discount (35%) and pay only 26,000 yen
- They receive 6,000 yen (15%) in coupons

Firstly, the starting time for "Go To Campaign" was too early. As *Figure 7* shown, the number of new infections on 22 July (n=792) when "Go To Travel" started exceeded the peak value (n=708) during the first COVID-19. In the same principle, the number of new infections on 1 October (n=623) when "Go To Eat" started exceeded the peak value (n=596) during the first nationwide declaration of "State of Emergency". Therefore, it was inappropriate to start "Go To" at a time when the number of new daily infections kept increasing.

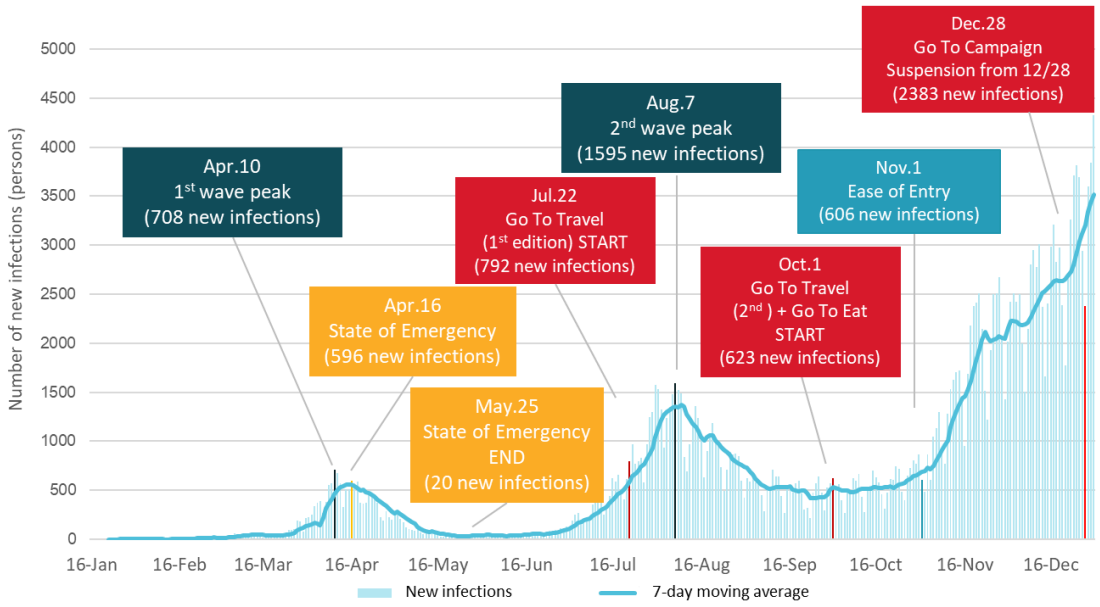


Figure 7 The trend of domestic daily infections in Japan in 2020. Compiled Ministry of Health, Labour and Welfare (2020).

Secondly, there are also doubts about the contents which "Go To" campaign advocates. For example, "Go To Travel" encourages domestic travelling which would necessarily increase the mobility of individuals and possibility of getting infected in trip. In the research of Zhou et al. (2020), restricting human mobility is highly recommended in this pandemic because it can control COVID-19 outbreaks effectively and reduce the spread of infections by up to 90%. So on the contrary, the rising human mobility caused by "Go To Travel" has high possibility to facilitate the spread of coronavirus. Besides, "Go To Eat" can have a similar result in helping with the outbreak because the campaign gathered people in restaurants which violates the avoidance of "3Cs" (Closed spaces, Crowded places, Close-contact settings) emphasized by the government (Ministry of Health, Labour and Welfare, 2020).

Moreover, researchers have already proved that a 4-week (from August 3rd, 2020 to August 31st, 2020) subsidy program called "Eat Out to Help Out" (EOHO) which is similar to Japan's "Go To Eat" greatly facilitated the spread of coronavirus (Fetzer, 2020). Difference-in-difference analyses were mainly used in the research. *Figure 8* introduced the year-on-year change in restaurant visits in the UK foodservice industry. EOHO program, leading to a significant increase in restaurant visits over the previous year's levels and potentially moved visitors to weekdays when discounts were available. As a result, the number of COVID-19 clusters started to grow immediately one week after the start of EOHO program and to drop strikingly one week after the end (see *Figure 9*). The EOHO program has been proved to account for about 10% of all new COVID-19 clusters during the campaign period in the UK (Fetzer, 2020).

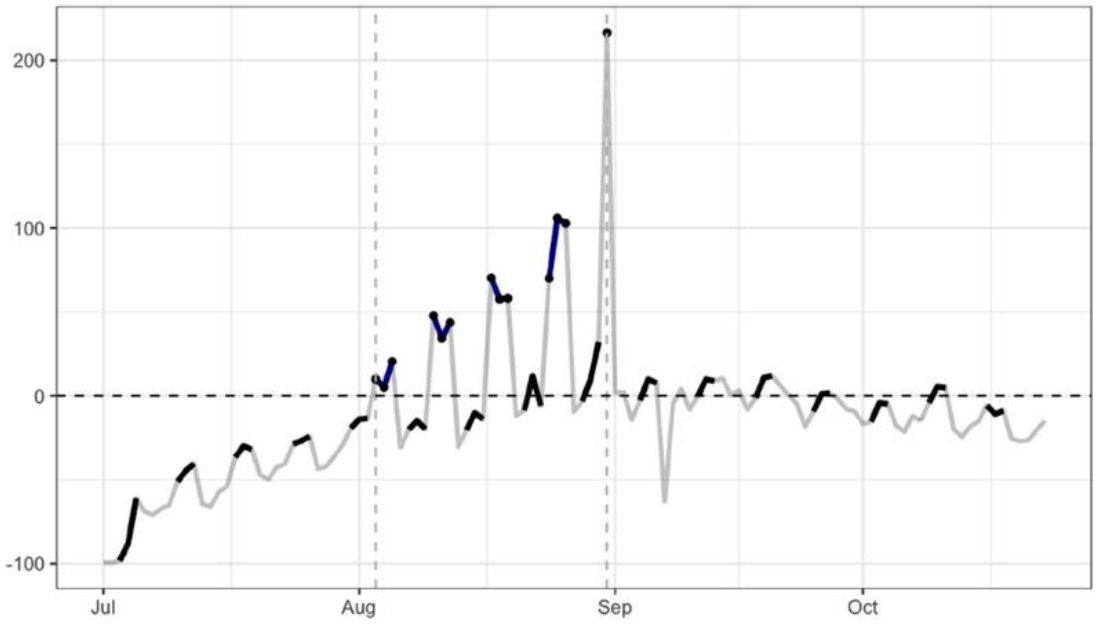


Figure 8 Year-on-year change in restaurant visits, measuring the state of the UK foodservice industry by OpenTable (%). Graph from Fetzer, T. (2020). Subsidizing the spread of Covid19: Evidence form the UK's Eat-Out-to-Help-Out scheme. *CAGE Working Paper,* 517.

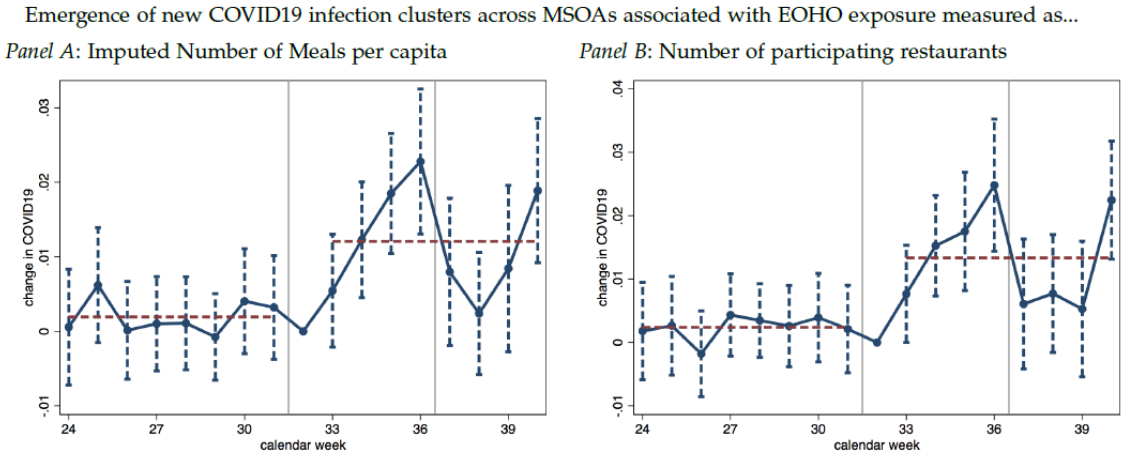


Figure 9 Differences and parallel trend assumptions: the impact of the EOHO scheme on the COVID19 cluster. Graph from Fetzer, T. (2020). Subsidizing the spread of Covid19: Evidence form the UK's Eat-Out-to-Help-Out scheme. *CAGE Working Paper,* 517.

Lastly, evidences have been found by Japanese medical researchers that people who participated in “Go To Travel” are more possible to experience the five symptoms indicative of COVID-19 including high fever, throat pain, cough, headache, and especially smell and taste disorder then non-participants (Miyawaki, Tabuchi, Tomata, & Tsugawa, 2020).

3.3 Summary

In summary, it has been a dilemma between preventing COVID-19 diseases and recovering the economy in the pandemic. As discussed above, many facts and analyses have supported that “Go To” policies are inappropriate to be implemented in the pandemic because they facilitated and accelerated the spread of coronavirus and became the catalyst of the third COVID wave. Instead of subsidizing “Go To” businesses, the government is more expected to leverage the medical care systems which are very close to collapse due to the surge of infections at the moment.

4. Conclusions

Based on the analyses in Chapter 2 and 3, it is clear that currently in the pandemic of COVID-19 in Japan, the outbreak of new coronavirus and its variants is still expanding on one hand and on the other the effects of domestic economic revitalization is very limited by the "Go To" policies. As long as the virus spreads among the whole population, the economic markets will be affected heavily especially due to the sudden decrease in labour force and increase in medical burdens. Thus, it can be said that the balance between disease control and economic recovery which the Japanese government aimed at has almost collapsed.

In the trade-off between health and economy, it is suggested to policy makers that disease control should always be the first priority in order to reduce not only the population cost regarding the loss of lives which may lead to further and deeper economic loss in the long term, but also to reduce the huge potential economic burden especially in medical systems in short term under this pandemic of COVID-19.

Last but not least, this paper reveals the general situations of COVID-19 outbreak in Japan and analyses the "Go To" policies taken by the government qualitatively, but there are still a lot of limitations such as no direct evidence to show how much proportion of the infections are attributed to the "Go To Campaign" and how many actual infections are there. Future studies can narrow down the range of research from the nation to regions where case studies can be conducted, etc. In particular, tourism cities and non-tourism cities can be compared by collecting the relevant data to examine the real effects of "Go To" policies from both disease control and economic recovery perspectives because from the starting points the economic reviving policies are aiming good for the Japanese society. Since the restart of "Go To" has been under consideration after the third wave of COVID-19 in Japan, how to learn from the previous experience and failure can greatly help the improvement and development of the future "Go To" policies aiming at recovering the domestic economy. Furthermore, the relevant high correlation between Japan and the USA in the number of daily new infections also leaves some space for future researches and studies such as revealing the reasons of this kind of infection pattern and comparing with other regions.

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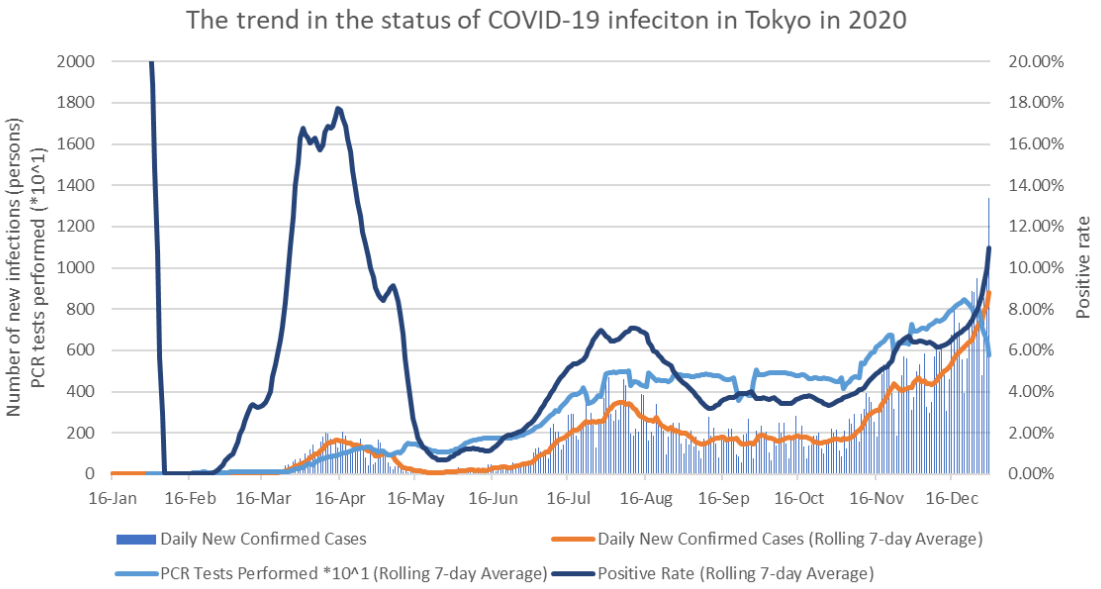
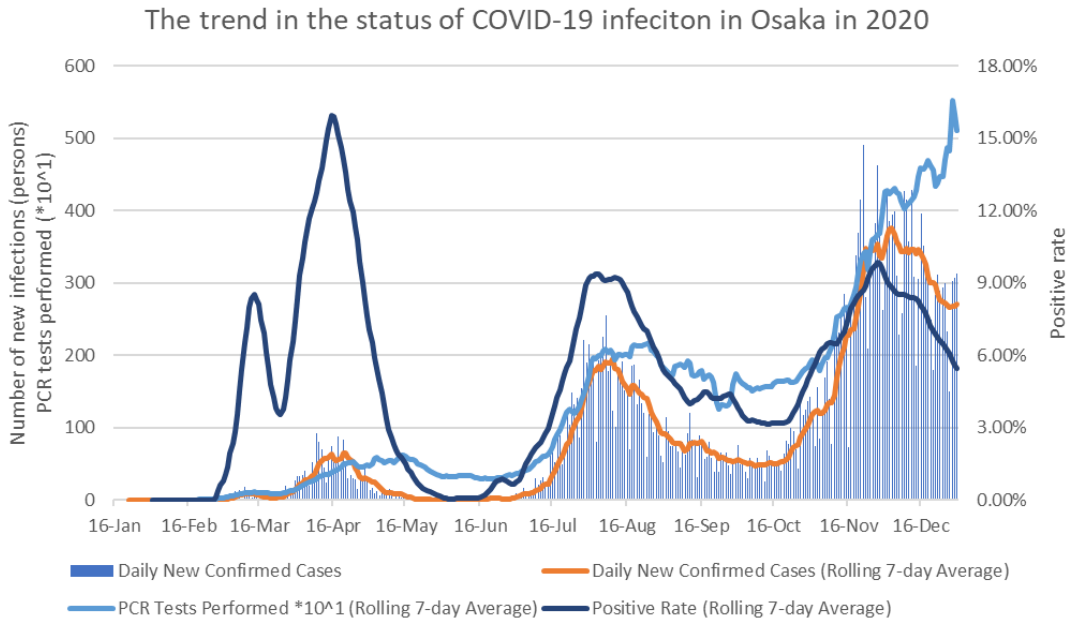
Appendix

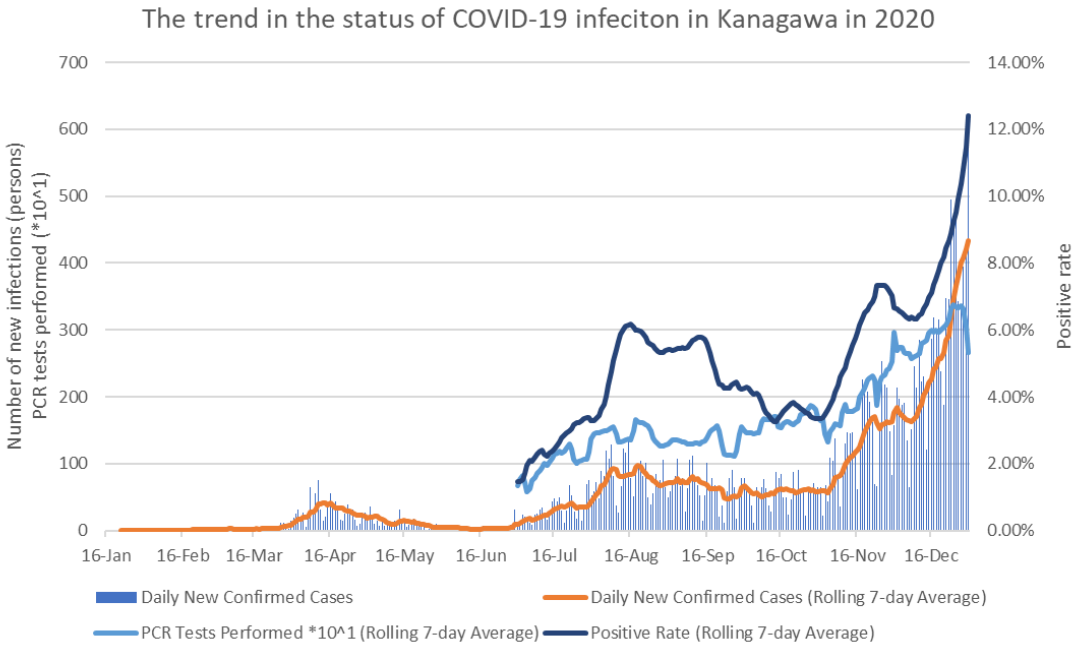
The trend in the status of COVID-19 infection in six main prefectures (Tokyo, Osaka, Kanagawa, Hokkaido, Hyogo and Fukuoka) in Japan



Source: Compiled from Tokyo Metropolitan Government

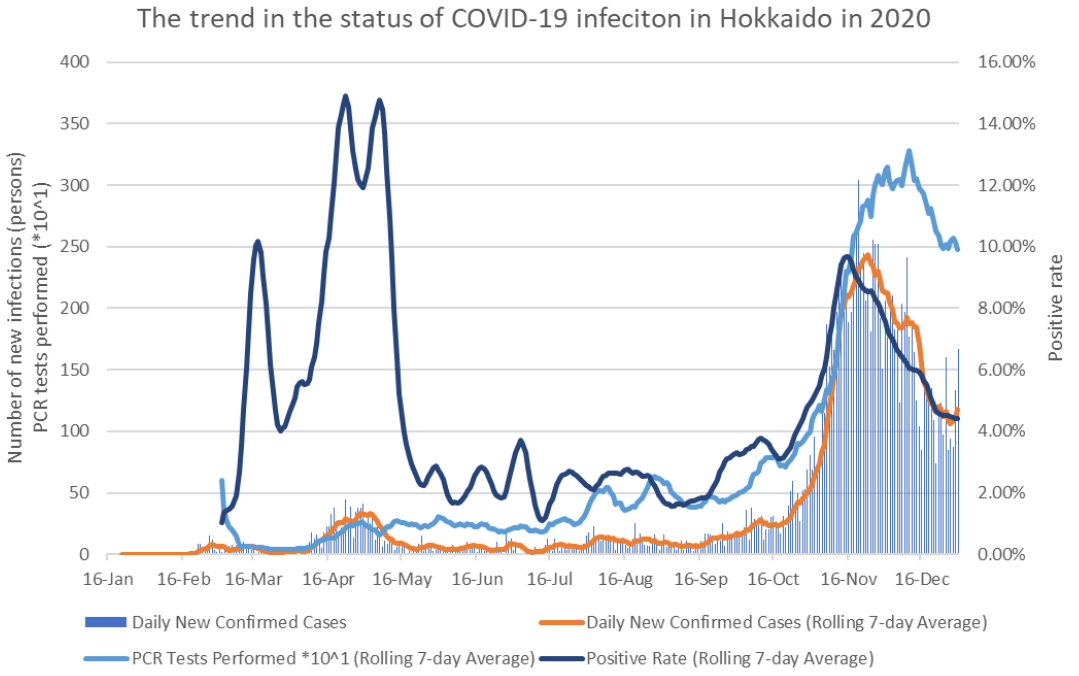


Source: Compiled from Osaka Prefectural Government

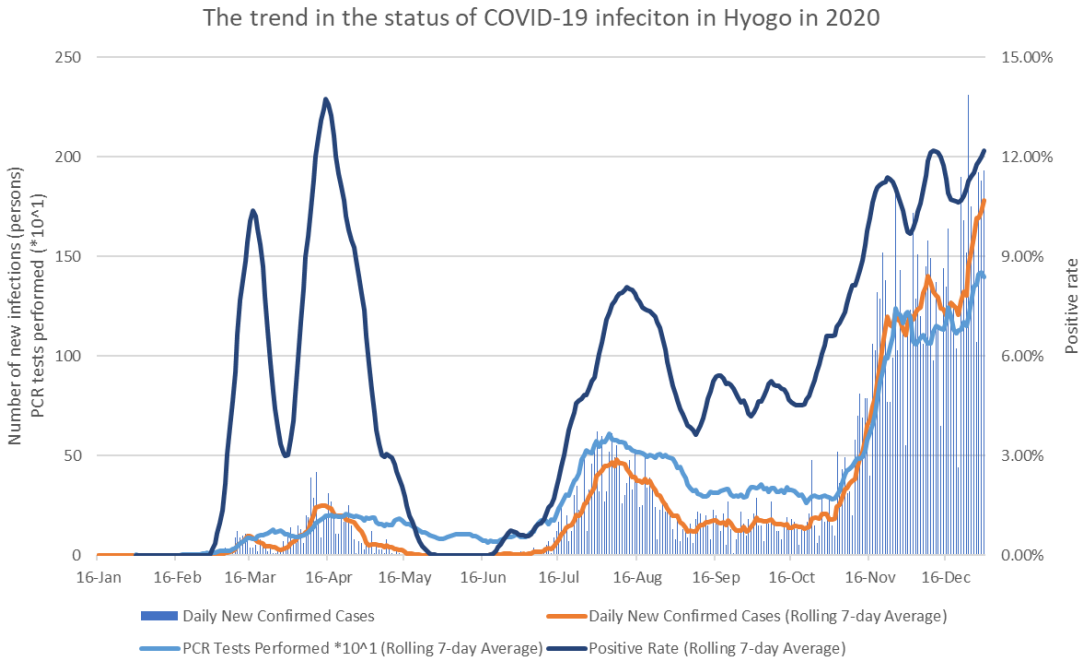


*Note: The data of PCR tests performed in Kanagawa prefecture is only available from July 1, 2020.

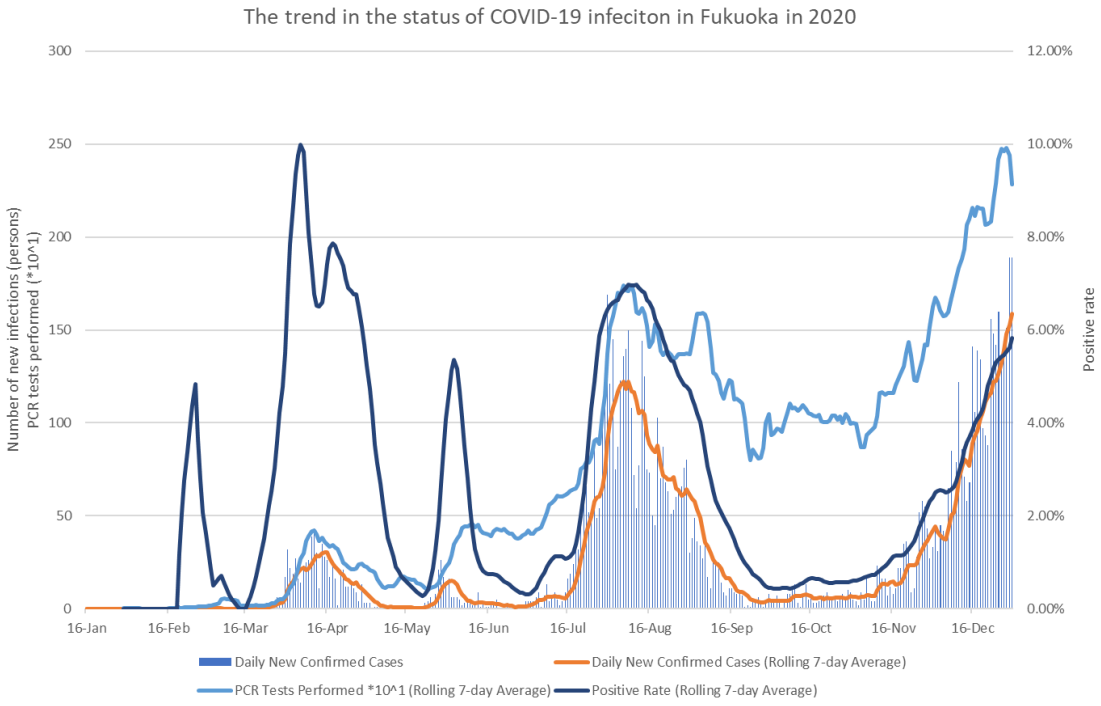
Source: Compiled from Kanagawa Prefectural Government



Source: Compiled from Hokkaido Government



Source: Compiled from Hyogo Prefectural Government



Source: Compiled from Fukuoka Prefectural Government