Mizuho Economic Outlook & Analysis

April 28, 2021

Impact of the third declaration of a state of emergency

What actions are needed to prevent a resurgence of infections in the second half of the year?

Summary

◆ Japan's third declaration of a state of emergency, issued on April 25, 2021, imposed severe restrictions, including requests for commercial facilities and restaurants to temporarily close or restrict their business. The number of people venturing outside (turnout) for various purposes has been therefore expected to fall to the level of last spring, presenting the large possibility of negative growth in the Apr.–Jun. quarter, due to a drop in consumption.

◆ The current fourth wave of Covid-19 infection is expected to be abated by June. However, Japan could face a bigger problem in the second half of the year. If highly infectious mutated strains remain, we could see repeated resurgences of infections and another declaration of a state of emergency by the end of this year, causing the risk of a significant downturn in the Japanese economy.

◆ To prevent a resurgence of infections in the second half of the year and to bring the Covid-19 pandemic to an early end, continuous behavioral changes should be promoted in addition to the significant expansion of testing and parallel vaccination for the elderly and working-age population.

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1. Introduction

Since March 2021 in Japan, the number of people infected with Covid-19 has increased rapidly, especially in the Kinki region. In Osaka, the number of new infections per day exceeded 1,000 for the first time on April 13. In the Kanto region, the number of new infections in Tokyo exceeded 800 on April 21, and since then, the spread of the disease has continued at about 1.2 times the pace of the previous week. Only a month after the third wave of infection that raged during the year-end and New Year holidays subsided and after the second declaration of a state of emergency was lifted in the Tokyo metropolitan area on March 21, Japan ended up entering a fourth wave of infection. In response to this situation, on April 23, the Japanese government decided to issue the third declaration of a state of emergency.

Mutated strains of the original virus (hereinafter referred to as "variant"/"variants") are currently thought to be one of the reasons for such a rapid increase in the number of infections. In Japan, many cases of infections with the so-called "U.K. variant" (or Alpha variant, also known as B.1.1.7) have now been reported. The U.K. variant is said to be highly infectious, and patients tend to develop serious cases. If the U.K. variant replaces the conventional strain and becomes the mainstream, it will be more difficult to control infection, and the burden on the medical system could rapidly increase. In fact, in the Kinki region, it seems that we are now standing on the brink of a medical system collapse, with the use rate of beds for patients with serious cases in Osaka approaching 100%.

According to Japan's Ministry of Health, Labour and Welfare (MHLW), the number of positive variant cases as a percentage of the total number of variant screenings nationwide rose to 46% in early April. Although there is much uncertainty about the future, it was reported in the MHLW's COVID-19 Advisory Board that the percentage of variant cases in Japan's three major metropolitan areas and in Okinawa could rise to about 80% by early May, causing an urgent need to evaluate the epidemiological and economic impact of such a situation.

Therefore, in this paper, we separately formulated epidemiological models for the elderly and working-age population and conducted simulations of infection trends and economic impacts by assuming that the variants continue to spread.

First, we simulated the effect of the third state of emergency currently in effect (which is intended to control the ongoing fourth wave of the disease) on the reduction of turnout and control of infection, in order to estimate impact on the Japanese economy. Further, assuming that the variants remain highly infectious and stay in Japan even after the fourth wave has abated, we examined what measures need to be taken to avoid a resurgence of infections requiring a re-declaration of a state of emergency in the second half of the year. Specifically, our analyses present that, if the following three measures are realized, a

resurgence of infections in the second half of the year will be prevented and economic activities will gradually be restored, which will contribute to early termination of the Covid-19 pandemic. The measures are: significant expansion of the testing system, vaccinating the elderly and the working-age population in parallel, and thoroughly changing people's behavior when eating and drinking.

2. Japan's economy: Likely to show negative growth in the Apr.–Jun. quarter due to the third declaration of a state of emergency

(1) Overview and assumptions of the recent declaration of a state of emergency

An overview of the third state of emergency recently issued is as follows. The declaration covers four prefectures (Tokyo, Kyoto, Osaka, and Hyogo) for 17 days from April 25 (Sunday) to May 11 (Tuesday). This time, for the first time, restaurants (those that serve alcoholic beverages and that offer karaoke) were asked to severely restrict business operations, while those that do not serve alcoholic beverages were requested to shorten their business hours, effectively closing them at 8 p.m. (**Chart 1**). Further, commercial and entertainment facilities were asked to restrict business operations, although they were not in the second declaration issued in January 2021. There has been no request to close schools or to refrain from holding events this time, unlike the case in the first emergency declaration last spring. However, the scope of the request for restrictions is considered to be stricter than in the previous two declarations of a state of emergency.

(2) Simulation of the state of emergency via an epidemiological model

With this third state of emergency, will it be possible to suppress the fourth wave, which is characterized by more-infectious variants? To answer this question, we conducted a simulation for the third state of emergency using the epidemiological model as stated in this paper, and we estimated the number of new infections, hospitalizations, and patients with serious cases. Assumptions about the state of emergency used in the simulation are shown below (**Chart 2**).

Chart 1: Overview of the state of emergency

		1st	2nd	3rd (for the initial period)
Period		Apr. 7 to May 25, 2020 (7 weeks)	Jan. 8 to Mar. 21, 2021 (10 weeks)	Apr. 25 to May 11, 2021 (17 days)
Areas in scope		**Nationwide**	**11 prefectures** Tochigi, Saitama, Chiba, Tokyo, Kanagawa, Gifu, Aichi, Kyoto, Osaka, Hyogo, and Fukuoka	**4 prefectures** Tokyo, Kyoto, Osaka, and Hyogo
Policy measures	Request for closing of school	In scope	Not in scope	Not in scope
	Requested to restrict business	Entertainment facilities, sport/amusement facilities, theaters, commercial facilities, etc.	Not in scope	Entertainment facilities, sport/amusement facilities, theaters, commercial facilities, etc. **Restaurants serving alcohol**
	Requested to shorten business hours	Restaurants (closing at 20:00) (serving alcohol: last orders at 19:00)	Restaurants (closing at 20:00) (serving alcohol: last orders at 19:00)	Restaurants not serving alcohol (closing at 20:00)
	Urging shorter business hours	Not in scope	Entertainment facilities, sport/amusement facilities, theaters, commercial facilities, etc.	Not in scope
	Urging not holding events	In scope	Not in scope (stricter-than-usual rules applied)	Not in scope (stricter-than-usual rules applied)

Source: Made by MHRT

Chart 2: Assumptions of the state of emergency

Date	Government actions and events
Apr. 23	Declaration of a state of emergency decided to be issued for 4 prefectures (Tokyo, Osaka, Kyoto, and Hyogo) in the period from Apr. 25 to May 11
From Apr. 25	Declaration of a state of emergency with stricter measures (requesting business restrictions for large commercial facilities and restaurants)
Early May	Prefectures in the scope of the declaration of a state of emergency expanded (to include, assumingly, Kanagawa, Chiba, Saitama, Shizuoka, Aichi, Gifu, Mie, and Okinawa), covering regions that account for about 60% of Japan's GDP
Mid-May	Declaration of a state of emergency extended (until the end of May); restrictions on economic activities relaxed after the Golden Week holidays (requests for business restrictions cancelled but shorter business hours at restaurants still being requested)
Late May, early & mid-Jun.	Declaration of a state of emergency re-extended (until the end of June); declaration of a state of emergency gradually lifted from regional areas
Late Jun.	Declaration of a state of emergency decided to be lifted completely
Jul. 4	Tokyo Metropolitan Assembly election
Jul. 23	Tokyo 2020 Olympic Games held with domestic spectators only (until Aug.8)
Aug. 24	Tokyo 2020 Paralympic Games held (until Sep. 5)
Sep. 30	Term of the president of the Liberal Democratic Party expiring
Oct. 21	Terms of the members of the House of Representatives expiring

Source: Made by MHRT

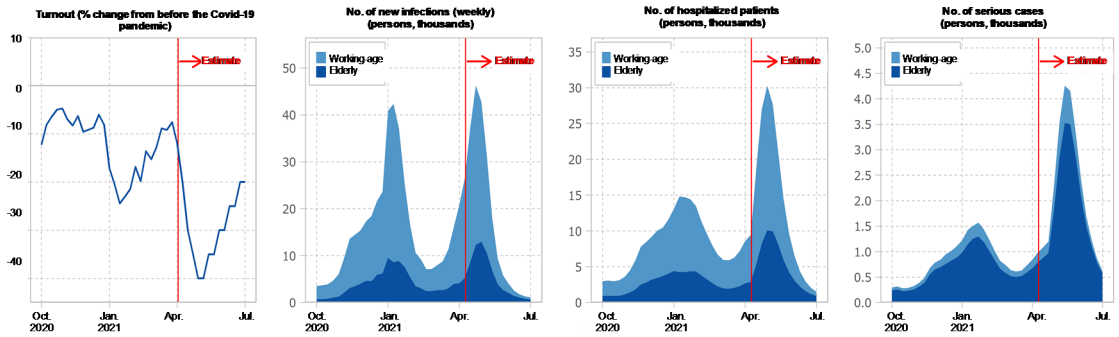
First, the simulation assumed that declarations would be issued for eight prefectures, namely, three in the Tokyo metropolitan area (Saitama, Chiba, and Kanagawa), four in the Chukyo metropolitan area (Gifu, Shizuoka, Aichi, and Mie), and Okinawa, toward early May, in addition to the previously mentioned four prefectures, adding up to 12 prefectures in total. The reason for including these areas as subject of the simulation is that the ratio of variants among the infection cases is increasing (24% in the Tokyo metropolitan area, 55% in the Chukyo metropolitan area, 79% in the three prefectures of the Kinki region, and 22% in Okinawa between April 5 and 11) and the number of patients is expected to increase, which will add pressure to the medical system. Then, in consideration of the severity of the measures of the emergency declaration this time, we assume that turnout would temporarily decline to the level of the first emergency declaration in the spring of last year.

Chart 3 shows the results of the simulation based on the above-mentioned assumptions. We expect that the number of new infections will peak at around May 11, the initial deadline for the declaration of a state of emergency, and will start to go down from there. However, at that time, the number of hospitalized patients and those with serious cases would still be high, and therefore the state of emergency will be unavoidably extended. (As of this writing, it is tentatively assumed that the declaration will be extended until the end of May.) However, it is assumed that some restrictions on economic activities will be relaxed after the extension. One example is the shift from requesting restaurants to severely restrict business operations to requesting shorter business hours in general, due to the improved situation of infections. As a result, turnout is expected to recover gradually from

around the latter half of May.

The number of new infections is expected to go down by the end of May, but the number of patients with serious cases will remain high, due to a time lag between infection and the increase in severity of symptoms. This will inevitably cause an extension of the state of emergency (assuming that it will be extended until the end of June). After that, the state of emergency will be lifted gradually from regional areas based on a comprehensive assessment of the infection trend and the degree of improvement in the situation regarding the medical system. Then, it is expected to be lifted completely nationwide by the end of June, making the period of emergency declaration this time about eight weeks. Although the variants are more infectious than conventional strains, the state of emergency this time is expected to last for a slightly shorter term than the second declaration (about 10 weeks from January 8 to March 21), as a result of strict measures taken to control the outbreak.

Chart 3: Epidemiological model simulations for the state of emergency



Note: Turnout is based on Google's retail and recreation mobility data for restaurants and commercial and entertainment facilities (% change from the period from January 3, 2020 to February 6, 2020). Estimates of the number of hospitalized patients and the number of patients with serious cases are on a potential basis and does not consider the upper limit based on the number of available beds.
Source: Made by MHRT based upon data disclosed by MHLW and Google LLC

(3) Impact on the Japanese economy in the Apr.–Jun. quarter: Negative growth highly expected due to a downturn in personal consumption

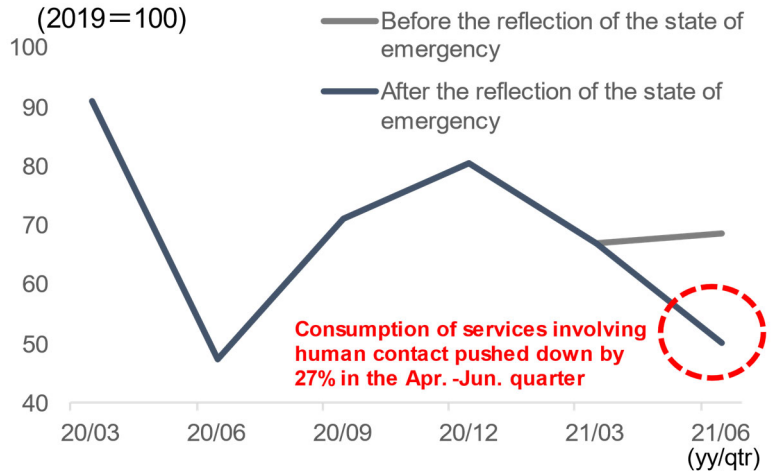
Next, we analyzed the impact of the state of emergency by assuming that it is declared as described above.

As a result of the severe measures to be taken in the 12 prefectures mentioned above (which account for about 60% of the national GDP), including requests for restaurants and commercial facilities to severely restrict business operations, the level of turnout and consumption of services involving inter-personal contact (food services/restaurants, accommodation, travel/transportation, entertainment) in the Apr.–Jun. quarter is expected to fall to the level of April and May of last year, on average. (However, unlike last spring, factories will not stop operations, and therefore the impact on exports and production is

expected to be limited.)

Chart 4 compares the path of the consumption of services involving inter-personal contact under and not under a state of emergency. (For the path under a state of emergency, the level of consumption of services involving inter-personal contact is weighted based on the economic shares of the regions where the state of emergency is declared and not declared.) The level of consumption of services involving inter-personal contact had already declined in the Jan.–Mar. quarter due to the second state of emergency, and we assumed that recovery in the Apr.–Jun. quarter would only be moderate due to quasi-emergency measures and the separate emergency declarations of local governments. In this sense, the consumption of services involving inter-personal contact, which was already expected to remain low even in the absence of a new emergency declaration, further deteriorated due to the third state of emergency.

Chart 4: Path of the consumption of services involving inter-personal contact (decline in the Apr.–Jun. quarter)



Source: Made by MHRT based upon “JCB Consumption NOW” by JCB/Nowcast and “Quarterly Estimates of GDP” by the Cabinet Office, etc.

Under the state of emergency, the consumption of services involving inter-personal contact in the Apr.–Jun. quarter is estimated to decline by about 45% in the areas under the declaration (compared to the situations where no emergency declaration is issued) and by about 27% for Japan as a whole. Since service consumption involving interpersonal contact accounts for about 15% of the total personal consumption (see Sakai and Yazawa [2020]), personal consumption in the Apr.–Jun. quarter will decline by about 4%, with the GDP declining by about 2%.

Even before the declaration, the rebound of Japan’s economy in the Apr.–Jun. quarter was expected to be weak after the slump of the Jan.–Mar. quarter, as the recovery in service consumption was expected to remain at a moderate level as mentioned above (according

to the February forecast by Mizuho Research & Technologies [2021], GDP for the Apr.–Jun. quarter expected to increase by 1.1% from the previous quarter). Considering the production cutback in the automobile industry (and a resulting decline in automobile exports and domestic sales) in May and June due to the suspension of supply of semiconductors for automotive applications,[1] it is highly likely that the Japanese economy will see negative growth for the second consecutive period in the Apr.–Jun. quarter.

3. Second half of the year to be a critical period: Expanded testing and parallel vaccination of the elderly and working-age population to prompt early normalization of the economy

As mentioned above, although the current fourth wave has been accompanied by severe restrictions on economic activity, it is estimated that the country will be able to overcome the difficulty by the end of June (still, it will take longer than the government's expectations). Having said that, the real problem comes thereafter. Once the highly infectious variants replace conventional strains, the variants are likely to dominate for a while. This means that a highly infectious situation will continue throughout Japan, and even after the wave of infection abates, it could easily spread again when turnout recovers. This is exactly what we experienced in March and April this year.

Preventing a resurgence of infections in the latter half of the year is certainly the mission of the government of Japan, as it plans to host the Tokyo Olympics. In this section, we present three measures that will be necessary after the fourth wave peaks out, and we verify the effectiveness of these measures based on a simulation of epidemiological models.

(1) Three measures to prevent a resurgence of infections in the second half of the year

a. Major expansion of the testing system

The first step that should be taken is the significant expansion of the testing system. Such an expansion would lead to the early detection and isolation of infected people, and, as a result, secondary infections would be reduced, which would have the effect of reducing the spread of infection. This would help increase turnout to a certain level while preventing a resurgence of infections, and this would contribute to infection control and economic recovery. In addition, the controlling the spread of the disease via the quick isolation of infected people would have the effect of prompting the acquisition of herd immunity, which would help to bring a faster end to the Covid-19 pandemic.

According to MHLW, PCR testing capacity in Japan is at about 180,000 tests per day

[1] If global automobile production in the Apr.–Jun. quarter were to decline by 1 million units, with domestic production down by 500,000–600,000 units, and if the ripple effect on other industries are taken into account, this is expected to push down the GDP by more than 1% in the Apr.–Jun period.

as of the date of this paper, whereas the average number of tests conducted during the week of April 16–22 was only about 60,000 per day (**Chart 5**). It is important to reduce the pace of infection spread, first by conducting large-scale and frequent testing of populations considered to be at relatively high risk of infection by fully utilizing said capacity.

One of the concerns with such large-scale and frequent testing is that people that are relieved to have tested negative could become more active in their daily lives, which could end up leading to a spread of infection. In addition, as PCR testing is not 100% accurate, people with "false negatives," i.e., those that test negative but that are actually positive, would be included among those people. Therefore, when conducting large-scale and frequent testing, the public must be fully informed that the purpose of the test is not to confirm a negative result, and that even if a person is currently negative, there is a possibility that he or she could be infected in the future and that it is essential to continue basic practices to prevent infection.

b. Introduction of parallel vaccination for the elderly and the working-age population

The next measure that needs to be implemented is a change in the vaccination scheme. The current vaccination schedule gives priority to those aged 65 and above, and the vaccination of the working-age population (64 and below) begins only when the vaccination of the elderly is almost completed.

The reason for giving priority to the elderly in vaccination is that the early prevention of infection among the elderly, who is more likely to develop serious cases compared to the working-age population, is thought to help reduce pressure on the medical system. In fact, average figures since last November show that the elderly accounts for about 80% of the number of patients with serious cases. In terms of securing hospital beds for patients with serious cases and curbing the number of deaths, it is reasonable to give priority to the elderly for vaccination.

If vaccination progresses as expected, a certain level of immunity will be established in the elderly population by summer, preventing infection from spreading through contact among them. Therefore, if the infection spreads again in the second half of the year, it is highly likely that it will spread within the working-age population.

Is the problem smaller if a resurgence of infections occurs in the working-age population, where the rate of serious cases is relatively low? It is true that the rate of serious cases is lower than that of the elderly. In the working-age population in their 40s and 50s, the ratio of serious cases (the ratio of serious cases to those that require treatment in the hospital) was estimated to be 0.3–0.5% in late April (compared to 1.2–2.1% in the elderly in their 60s and 70s). Although the elderly account for the majority of serious cases, the working-age population accounts for about 70% of all patients that require hospitalization.

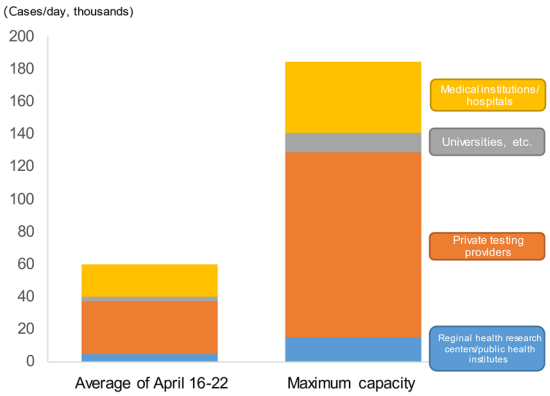
If the number of infected people among the working-age population increases rapidly, available beds in hospitals could be reduced significantly.

In addition, when infection spread in the past, it tended to spread first among the working-age population and then among the elderly (**Chart 6**). Since the working-age population is more active and has more contact with other people, this kind of behavior was likely to cause infection in the home and at public facilities, which in turn leads to the spread of infection among the elderly. Therefore, the early control of infection in the working-age population via a parallel vaccination scheme is expected to prevent infection in the elderly.

Therefore, we should think that it is practically difficult to give priority to the recovery of economic activities only by suppressing the infection of the elderly, without taking any measure for a resurgence of infections in the working-age generation. Economic activity can be normalized only when the vaccine spreads to the elderly and the working-age population as a whole, with herd immunity being acquired.

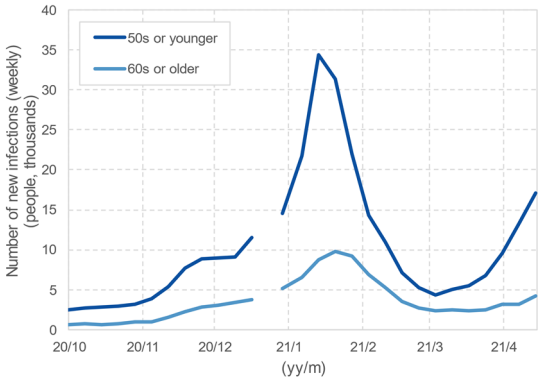
From this viewpoint, it should be clear that, vaccinating the elderly and the working-age population in parallel, after the vaccine has spread to the elderly to some extent, would help the entire population gain herd immunity sooner, leading to an early end to the Covid-19 pandemic. In addition, if we start vaccinating the working-age population early, this will give us room to recover turnout while preventing a resurgence of infections in the second half of the year, thus speeding up the recovery of economic activities.

Chart 5: Actual PCR testing performed and maximum capacity



Source: Made by MHRT based upon data disclosed by MHLW

Chart 6: Number of new infections by age group



Note: The graph stops for December 2020 due to the necessity of confirming the age of patients (unknown at the time).
Source: Made by MHRT based upon data disclosed by MHLW

c. Thorough changes in behavior

The last measure is to thoroughly change behavior. As pointed out in many studies,

among various social activities, eating and drinking present the highest risk of infection. This is because masks must be removed when eating and drinking, and droplet infections can occur if people talk without a mask. Therefore, in order to prevent a resurgence of infections, it is essential to reduce the risk of infection when eating and drinking. For example, until the end of the Covid-19 pandemic, we need to change our behavior by "eating silently," which means never talking without masks while eating or drinking, and "eating alone," which means visiting restaurants alone whenever possible. If we can reduce the risk of infection while eating and drinking by strictly enforcing "eating silently" and "eating alone," we can prevent the spread of infection and recover turnout. This is expected to have a positive effect for business involved in personal services, such as restaurants, and would promote economic recovery in the second half of the year.

In contrast to the expansion of testing systems and changes in vaccination schemes, which are policy options that the government can directly implement, the thoroughness of such behavioral changes depends to a large extent on people's awareness. In this sense, national and local governments need to encourage people to change their behavior by disseminating information about the current situation of infections and the availability of medical treatment. In particular, the provision of information regarding the danger of the variants (such as the increase in the number of serious cases among people in their 20s and 30s without chronic disease in the Kinki region), which has never been experienced before, is expected to heighten the people's sense of crisis and encourage them to change their behavior (presenting the effect of information). As a matter of fact, from mid-January to early February this year, when the second state of emergency was declared, the number of infected people decreased at a higher pace than the pace of the decline in turnout, meaning the disease was less infectious. Part of the reason for this may have been the transformation of behavioral patterns based on this sense of crisis among the people.

(2) Epidemiological model simulation for the second half of the year reflecting the three measures

A simulation of the epidemiological model for the second half of 2021 and beyond was then conducted assuming that the above three measures aimed at preventing a resurgence of infections would be implemented. The assumptions of the simulation are as follows. First, regarding the substantial expansion of the testing system, it was assumed that large-scale testing would be continuously conducted after June, when the infections of the fourth wave abate, in order to enable early detection and the isolation of 15% of the people suffering from community-acquired infection. Next, with regard to parallel vaccination, it was assumed that the vaccination scheme would shift to a parallel vaccination scheme for the elderly and the working-age population when 50% of the

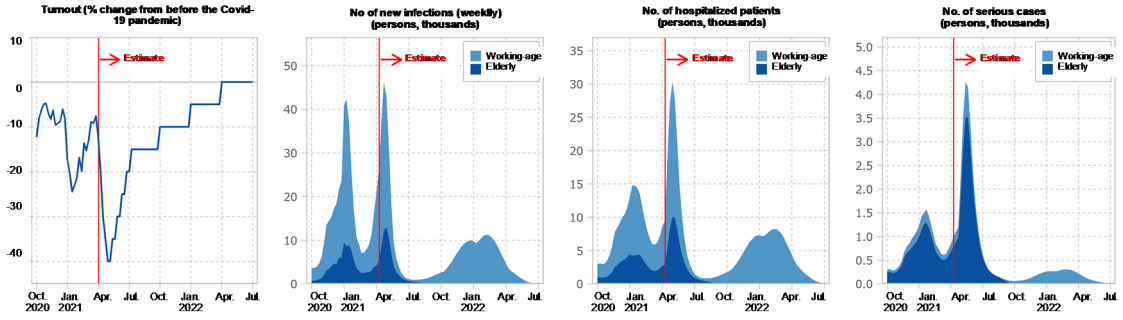
elderly population has been vaccinated (by around August 2021, based on the assumption of the pace of vaccination as per this paper), and that thereafter, vaccination would proceed at a ratio of 1:3 for the elderly and the working-age population. Lastly, with regard to the level of behavioral change, the declining infection rate from mid-January to early February this year was regarded as the result of behavioral change, and it was assumed that the same level of the decline in the infection rate would continue in the future.

The results of the simulation based on these assumptions are presented as the main scenario of **Chart 7**. After the current fourth wave has abated, it will still be necessary to maintain a rather low turnout (as per the level of the Jan.–Mar. quarter average of this year) during the Jul.–Sep. quarter, but after that, it will be possible to gradually restore turnout and bring economic activity back to pre-Covid-19 levels by April 2022. In this process, the number of infected people could temporarily increase from the end of 2021 to the beginning of 2022, but the number of infected people will naturally decrease in the early spring of 2022 due to the dissemination of vaccines, and it is estimated that this will not lead to a resurgence of infections to the extent that a state of emergency would need to be declared.

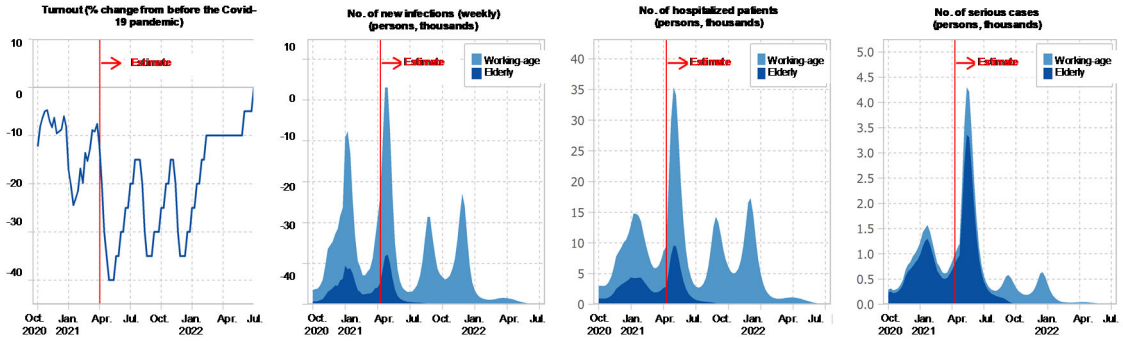
On the other hand, if the three measures mentioned in this paper are not implemented (as per the sub-scenario of Chart 7), the impact of highly infectious variants might not be reduced, and as soon as turnout recovers in the summer after the fourth wave abates, infection could resurge, and a fifth wave could occur. We assume that, in such a situation, the government would be concerned about pressure on the medical system and would then limit economic activities so that the number of hospitalized patients would not exceed the peak level of the third wave in January 2021, thereby controlling infections. Even with this, we expect a cycle of "increase in turnout, resurgence of infections, and the declaration of a state of emergency" to be repeated in the sub-scenario. Our simulation showed that the fifth wave would arrive in the Jul.–Sep. quarter and the sixth wave in the Oct.–Dec. quarter, and that the collapse of medical care could not be prevented without declaring a state of emergency each time. To give an overview, in the sub-scenario, the level of turnout will have to stagnate from the Apr.–Jun. quarter to the Oct.–Dec. quarter in 2021.

Chart 7: Epidemiological model simulation (FY2021 2H onward)

Main scenario: Case in which three measures to prevent a resurgence of infections are taken



Sub-scenario: Case in which three measures to prevent a resurgence of infections are not taken



Note: Turnout is based on Google's retail and recreation mobility data for restaurants and commercial and entertainment facilities (% change from the period from January 3, 2020 to February 6, 2020).
Estimates of the number of hospitalized patients and the number of serious cases are on a potential basis and do not consider the upper limit based on the number of available beds.

Source: Made by MHRT based upon data disclosed by MHLW and Google LLC

(3) Impact on Japan's economy under the scenarios: Absence of effective measures pushing down GDP by 1.6% in FY2021

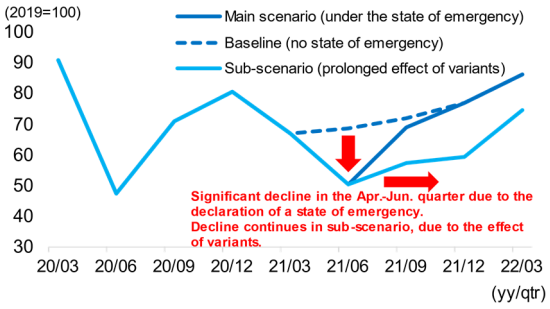
In this section, we estimate the impact of the above main and sub-scenarios on the Japanese economy for the entire year of FY2021. In **Chart 8**, the paths of the consumption of services involving inter-personal contact under the main and sub-scenarios are compared, using our forecast (baseline) as established before the declaration of the state of emergency in April.

According to our analysis, there will be a significant downward swing in the Apr.–Jun. quarter in the main scenario, but it will recover in a way that converges with the baseline path from the Jul.–Sep. quarter onward as government measures and other factors prevent a resurgence of infections and as turnout gradually recovers. In the full year of FY2021, the downside of consumption of services involving inter-personal contact from

the baseline is expected to be at about -7.0%, personal consumption at about -0.9%, and GDP at about -0.4%.[2] (As mentioned in the previous section, the recovery of consumption of services involving inter-personal contact was expected to be moderate, given that quasi-emergency measures and declarations of a state of emergency by local governments were assumed to be implemented even in the baseline. Considering the above, the additional downward swing due to a state of emergency would be smaller than that of last spring.)

In the sub-scenario, the prolonged impact of the increased infection capability of the variants will not allow for a recovery in turnout, and consumption of services involving inter-personal contact will remain sluggish throughout 2021. From the Jan.–Mar. quarter of 2022 onward, the level will recover toward the baseline with the spread of vaccination, but the full year of FY2021 will see a significant downturn. (The timing of the lifting of restrictions on economic activity due to the dissemination of vaccination and the acquisition of herd immunity is expected to be in the Apr.–Jun. quarter in 2022 in the baseline and main scenarios and in the Jul.–Sep. quarter in 2022 in the sub-scenario.) The rate of decline from the baseline in consumption of services involving inter-personal contact for the full year of FY2021 is expected to be about -20.6%, and about -2.5% for personal consumption. In terms of GDP, the downward swing from the baseline is estimated to be about -1.6% (**Chart 9**). Given that the February forecast by Mizuho Research & Technologies (2021) predicted a growth rate of +3.0% for FY2021, it would not be surprising if the growth rate in FY2021 falls to the mid-1% range if the sub-scenario is materialized.

Chart 8: Paths of consumption of services involving inter-personal contact (scenario comparison)



Source: Made by MHRT based upon "JCB Consumption NOW" by JCB/Nowcast and "Quarterly Estimates of GDP" by the Cabinet Office, etc.

Chart 9: Impact on the economy by each scenario

(Deviation from the baseline)

	Main scenario	Sub scenario
Consumption of services involving human contact (%)	- 7.0	- 20.6
Personal consumption (%)	- 0.9	- 2.5
GDP (%)	- 0.4	- 1.6
Compensation for employees (yen, trillions)	- 1.1	- 3.2
Number of unemployed (people, 10,000s)	+14	+43

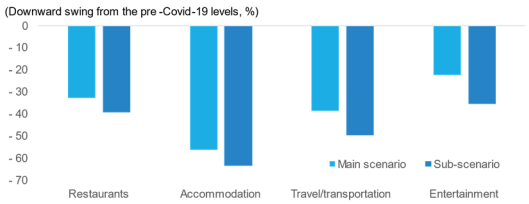
Source: Made by MHRT based upon "JCB Consumption NOW" by JCB/Nowcast, "Quarterly Estimates of GDP" by the Cabinet Office, and "Input-Output Tables for Japan" by the Ministry of Internal Affairs and Communications, etc.

[2] In addition to the downturn in services consumption, the impact of changes in other demand items, such as a decline in imports, are included. The same theory applies to the sub-scenarios discussed below.

With the growth rate thus falling below expectations, the impact on employment seems inevitable. Even with government support, including the re-extension of the special measures for subsidies for employment adjustment, some degree of employment adjustment, especially in the service sector, is likely to occur. According to calculations using the "Input-Output Tables for Japan" (issued by Japan's Ministry of Internal Affairs and Communications), under the main scenario, compensation for employees is expected to decline by 1.1 trillion yen and the number of unemployed is expected to increase by around 140,000 (the unemployment rate is expected to rise to the mid-3% range over the Jul.–Sep. quarter in 2021). In the sub-scenario, compensation for employees is expected to decline by 3.2 trillion yen, and the number of unemployed is expected to increase by about 430,000 (the unemployment rate is expected to rise to nearly 4% in the Oct.–Dec. quarter in 2021).

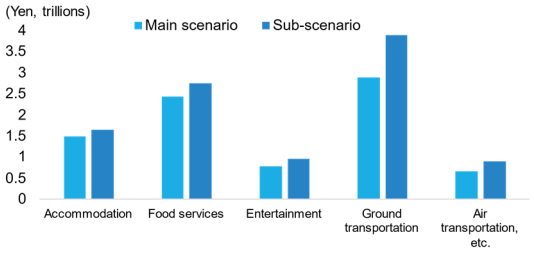
The government has a large role to play in this situation. Even without the declaration of a state of emergency, consumption of personal services and demand for inbound services were already expected to remain low during 2021. The spread of variants and the declaration of a state of emergency will further depress demand, forcing sales in the personal services industry to remain at a low level. Taking into account the decline in domestic demand (personal consumption) as well as the slump in corporate demand (such as a reduction in business trips and company dinners) and inbound demand (number of tourists to continue to decline during 2021), sales in the personal services industry in FY2021 will decrease by about 30% in the main scenario and about 40% in the sub-scenario compared to pre-Covid-19 levels (2019 average) (**Chart 10**). In particular, the accommodations industry will face a very difficult situation, with an expected decline of about 60% due to the combined impact of sluggish inbound demand and the Covid-19 pandemic. Taking these circumstances into account, the estimated amount of support (fixed costs + variable costs – sales) needed for small and medium-sized personal services businesses in FY2021 is about 8 trillion yen in the main scenario and about 10 trillion yen in the sub-scenario (**Chart 11**). Although not all of such support would be provided by public finances (direct spending by the government), as support by financial institutions is also expected, under the sub-scenario, and it is likely that a supplementary budget (i.e., an extension of the special measures for subsidies for employment adjustment, resumption of subsidy programs for sustaining businesses, increase in cooperative funds through increased subsidies for local governments, etc.) will be established, financed by the additional issuance of government bonds in addition to reserve funds of 5 trillion yen.

Chart 10: Decline in sales in the services industry (FY2021 vs. Pre-Covid-19 levels)



Note: Both domestic demand (household consumption + corporate demand) and overseas demand (inbound) are considered.
Source: Made by MHRT based upon "JCB Consumption NOW" by JCB/Nowcast and "Quarterly Estimates of GDP" by the Cabinet Office, etc.

Chart 11: Support required by service industries (small and medium-sized enterprises, FY2021)



Note: Estimated the difference between the amount of sales reflecting the decline in domestic consumption and inbound demand and variable costs/fixed costs; variable costs were assumed to be a constant percentage of sales. Fixed costs are the sum of labor costs, rents of movable and immovable property, taxes and dues, and interest expenses.
Source: Made by MHRT based upon "Economic Census for Business Frame" (2018), etc.

4. Uncertainty in the simulations

So far, we examined the impact of the recent declaration of a state of emergency and the epidemiological and economic effects of three measures to prevent a resurgence of infections in the second half of the year via simulations using an epidemiological model. The simulations in this paper are based on assumptions that are considered reasonable according to previous data and the results of various previous studies, but uncertainty inherently exists in the results of simulation. Before closing this paper, we would like to mention three factors that could bring uncertainty to the above simulations, which are, the decline in turnout due to the recent declaration of a state of emergency, the degree of increase in infection capability due to variants, and the pace of vaccination.

First, in assessing the impact of the recent declaration of a state of emergency, the simulations in this paper assumed that strict restrictions on economic activities would lead to a rapid and significant decline in turnout. However, turnout might not decrease as rapidly as expected due to opposition to repeated emergency declarations, fatigue regarding emergency declarations, and lack of a sense of crisis. In such a case, it could take time for the number of infected people to peak, and there is the risk that the emergency declaration could be extended beyond the time estimated by the simulations in this paper.

The next major source of uncertainty is the degree of increase in infection capability of the variants. Assumptions vary about how more powerful the variants are compared to conventional strains, ranging from about 1.3 to 1.9 times.[3] In this paper, we used 1.5 times,

[3] Please refer to the information provided by the National Institute of Infectious Diseases (https://www.niid.go.jp/niid/ja/diseases/ka/corona-virus/2019-ncov/10279-covid19-40.html) for "1.3 times," and Davies, et al.

which is in between 1.3 and 1.9 and which seemed reasonable. If the variants are more infectious than we assumed in this paper, the fourth wave will peak later than simulated in this paper, and room for recovery in turnout (i.e., room for economic recovery) in the second half of the year would become smaller. On the other hand, if the variants are less infectious, the peak of the fourth wave will come faster, leading to an increase in room for recovery in turnout in the second half of the year.

The pace of vaccination was based on the assumption of Onodera et al. (2021), and it was assumed that 3.5 million vaccine doses would continue to be administered every week after full-scale vaccination begins in May. Although Onodera et al. (2021) argued that the pace of vaccination in Japan would be slower than in the U.S. and the U.K., mainly due to the shortage of personnel to administer vaccination shots. Efforts to secure personnel are underway, including the MHLW's conditional approval of vaccination by dentists. Vaccination is basically carried out by local governments, but in Tokyo and Osaka, large-scale vaccination sites have been established by the central government with the capacity to vaccinate 10,000 people a day, and the government also has announced a policy in which vaccinations will be carried out by Japan Self-Defense Forces personnel that are qualified doctors and nurses, and this is expected to accelerate the pace of vaccination.

Although it is still difficult to achieve the government's target of completing the vaccination of the elderly by the end of July,[4] the pace of vaccination could be faster than assumed in this paper due to the efforts mentioned above. The acceleration in the pace of vaccination will directly lead to a stronger economic recovery in the second half of the year and an earlier end to the Covid-19 pandemic through the early acquisition of herd immunity. Therefore, we need to keep monitoring this trend.

5. Conclusion

Of the three measures to prevent a resurgence of infections in the second half of the year presented in this paper, detailed conditions for implementation are required especially for the significant expansion of the testing system and the parallel vaccination of the elderly and the working-age population. For the former, for example, priority areas and occupations for testing should be appropriately determined for the purpose of efficient screening. For the latter, ideally, the timing of the transition to parallel vaccination and the vaccination ratio between the elderly and the working-age population after the transition

(2021) (DOI: 10.1126/science.abg3055) for "1.9 times."

[4] In order to complete the vaccination of the elderly generation by the end of July, the pace of vaccination must be approximately 7.8 million doses per week for at least nine weeks (more than double the 3.5 million doses per week assumed in this paper). This is equivalent to 6.2 doses per 100 people per week. The U.S. is the only major industrialized country that has exceeded this pace on a continuous basis. Even in the U.K., where vaccination has spread considerably, the rate of 6 doses per 100 people per week was achieved only in a limited period in late March. From the viewpoint of international comparison, it will be very difficult for Japan to maintain the same pace.

should be determined so as to minimize the number of infected persons and serious cases. Although we were unable to examine such detailed conditions in this paper due to space limitations, the precedent of Hiroshima Prefecture can be used as a reference for expanding the testing system. In addition, various analyses have been made for parallel vaccination by the COVID-19 AI and Simulation Project as established by the Cabinet Secretariat, and their insights are expected to be useful.[5]

Over the past year or so, many lives have been exposed to the risk of infectious diseases, and healthcare workers have been under strong pressure. In addition, the repeated restrictions on economic activities have worsened the business of many companies and proprietors, mainly in the personal services industry, making employment unstable for those who work there, depriving students of opportunities to study and develop their abilities, and undermining healthy social life. The situation should not be repeated any further. We must bring an early end to Covid-19 by bravely implementing analysis-based countermeasures, with determination not to cause another explosion of infections. We hope that this paper will be of help.

[5] Please refer to COVID-19 AI simulation project (https://www.covid19-ai.jp/ja-jp).

Refer to the original Japanese report by clicking the URL below for the supplemental discussion and reference material.

https://www.mizuho-ir.co.jp/publication/report/2021/pdf/insight-jp210428.pdf