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Japan's Economy: Monthly Outlook (May 2021)

Economic outlook revised; spread of infection simulated based on pace of vaccination

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Summary

- In light of the announcement of the Jan-Mar 2021 GDP 1st preliminary results, we have revised our economic outlook. We now see Japan's real GDP at +3.1% in FY2021, with FY2022 at +3.3%. According to our main economic scenario, vaccination of healthcare professionals and the elderly against COVID-19 should be nearly complete by the end of September. Vaccination of around half of the entire nation is expected to be complete by the end of December. The pace of economic recovery is expected to pick up starting in the fall of 2021 when economic activity returns to normal. Meanwhile, the polarization between the US and China is expected to progress as strong recoveries in those economies continue.

- Recently, highly infectious mutant strains of COVID-19 have been spreading like wildfire, and the outlook for Japan's economy could undergo major changes depending on the pace of vaccination. If the pace of vaccination falls behind expectations, states of emergency could be declared three more times within the current fiscal year. There is a possibility that the real GDP growth rate in FY2021 could fall around 1%pt below our main scenario. Moreover, if the variant which has been spreading in India, which is said to be even more infectious than the one now spreading in Japan, also begins to spread here, the economic growth rate will likely decline significantly.

1. Outlook for the Economy After the 3rd State of Emergency is Lifted

Apr-Jun period real GDP likely to record negative growth for 2nd consecutive quarter

The real GDP growth rate for the Jan-Mar period of 2021 (1st preliminary est) declined by -5.1% q/q annualized (-1.3% q/q) (Chart 1)[1]. A declaration of a state of emergency was announced for the second time at the beginning of the year due to the resurgence of COVID-19 leading to the decline, centering on personal consumption. Looking at results by component, in addition to personal consumption, private sector capital expenditure and government consumption, as well as public investment, contributed to the decline. On the other hand, exports grew for the third consecutive quarter, while housing investment and private sector inventory also contributed to growth.

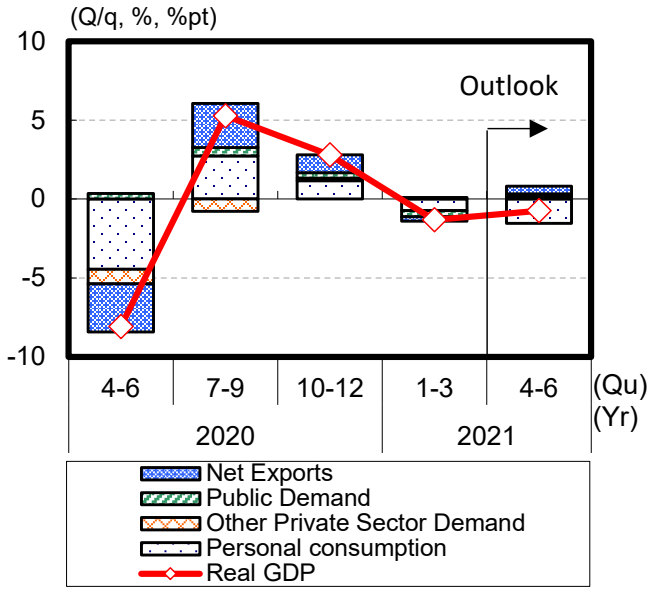
Looking at consumer turn-out at retailers and entertainment facilities[2] according to Google Maps location information data, we can see that the decline clearly began at the end of March when the decision was made to apply the "Special Stricter Measures" in Osaka, Hyogo, and Miyagi prefectures. Turn-out also shifted into the negative direction in regions including Tokyo which are unaffected by the Special Stricter Measures. It appears that consumers are voluntarily avoiding going out as fears rise in regard to the spread of infection. The decline in consumer turn-out has been ongoing nationwide since the declaration of Japan's third state of emergency on April 25 (Chart 2). Consumer turn-out remained at the lowest level seen during the second state of emergency even during the long vacation this spring, a period when turn-out could easily have increased. Hence, we can conclude that the effect of the third state of emergency on suppressing consumer turn-out was not small. Even so, the number of new infections according to recent reports remains high. It can therefore be concluded that measures such as the declaration of the third state of emergency and its extension were necessary in order to sufficiently suppress the spread of COVID-19, which gained momentum due to highly infectious mutant strains of the disease.

Consumption associated with eating out, travel and entertainment, which often involve face-to-face contact and being out and about, continue to experience weak performance in a reflection of fluctuations in consumer turn-out (Chart 2). As of the end of March 2021, consumption related to eating out, travel and entertainment was at around -15% in comparison to its performance before the coronavirus crisis. Considering the linkage with consumer turn-out at retail stores and entertainment facilities, the downturn is estimated at around -40% after the third declaration of the state of emergency (see Chart 5 for more detail on the effects of the declaration of emergency on Japan's economy).

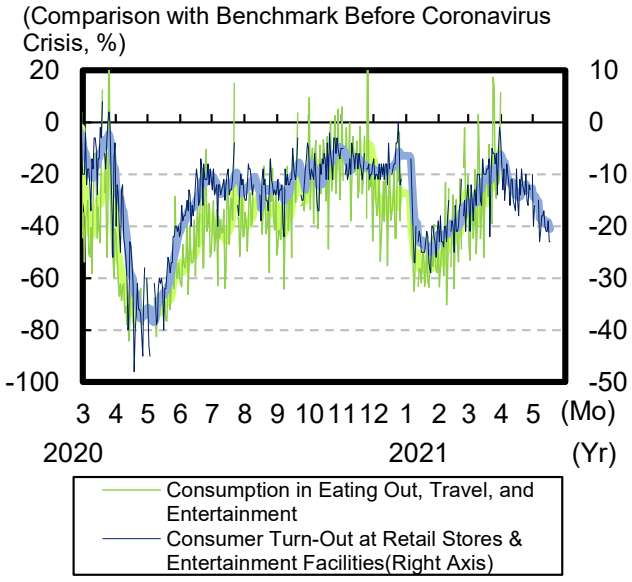
[1] See the DIR report by Keiji Kanda and Akane Yamaguchi dated 18 May 2021, *Jan-Mar 2021 1st Preliminary GDP Estimate*.

[2] Shopping centers, restaurants and bars, amusement parks, and movie theaters are included, but stores selling daily necessities, such as super markets, fresh produce markets, and drugstores, are not included.

Real GDP Growth Rate Results & Outlook **Chart 1**



Consumer Turn-Out and Consumption in Eating Out, Travel, and Entertainment **Chart 2**



Source: Cabinet Office, Ministry of Internal Affairs and Communications, Google, CEIC; compiled by DIR.
Note: The left side chart uses real figures, all seasonally adjusted. The benchmark used in the right side of the chart is the daily median between January 3 and February 6, 2020. The thick lines represent the 7-day central moving average. Eating out, travel, and entertainment related consumption is the total value of eating out, transportation, and culture & recreation services. Data from holidays falling on weekdays and the Obon Festival (8/10-14 2020) and year-end/New Year (12/28 2020-1/4 2021) are excluded.

The real GDP growth rate for the Apr-Jun period is expected to be at -2.9% q/q annualized based on the assumption that the state of emergency will be extended till the end of June. The decline is expected to center on personal consumption, with negative growth seen for the second consecutive quarter (Chart 1). The real GDP growth rate during the Apr-Jun period of 2020 recorded -28.6% q/q annualized, the steepest decline in the history of current statistics. Even if the current state of emergency expands to include the entire nation, the economy should not suffer a dramatic decline such as this. Not only was the downturn in domestic demand especially great in 2020, there was also a decline in overseas demand which contributed to the poor performance. Exports suffered a major decline due to the influence of lockdowns in the US and Europe and the disappearance of inbound tourism demand which is included in the export of services. Meanwhile, imports, which normally fluctuate in tandem with domestic demand and exports, suffered only a minor decline as special demand was generated for medical masks, medicines and personal computers. The current situation contrasts with this, in that overseas economies, centering on the US and China, are in the midst of a strong recovery, and exports are expected to maintain favorable performance (Chart 7, left). Meanwhile, domestic and overseas supply lines are maintaining stability, hence it is unlikely that there would be sharp growth in the import of products related to COVID-19 countermeasures. For these reasons we expect overseas demand to bring a positive contribution to real GDP during the Apr-Jun period of 2021.

Assumptions regarding vaccination and the state of emergency according to our main scenario

Japan's road to recovery is extremely susceptible to the pace of vaccination and the spread of highly infectious mutant strains of COVID-19. Our outlook in relation to these issues is based on the assumptions shown in Chart 3.

According to our main economic scenario, the percentage of persons having completed both the first and second vaccinations, which was at 1.9% as of May 19, is expected to rise to around 30% by the end of September, and around 50% by the end of December. This means that vaccination of healthcare professionals and the elderly against COVID-19 should be nearly complete by the end of September. The government targets the completion of vaccination of the elderly by the end of July, but the shortage in medical personnel giving the shots could cause constraints in performing vaccinations, this target is

expected to fall behind by around two months. After the third state of emergency is lifted, explosion in infections is expected to be avoidable thanks to the effects of the vaccine, and normalization of economic activity should progress smoothly on through to FY2022.

Assumptions Regarding Pace of Vaccination and State of Emergency **Chart 3**

	50% Vaccination Rate by Year-End: Main Scenario	80% Vaccination Rate by Year-End: Scenario 2	30% Vaccination Rate by Year-End: Scenario 3
Vaccination Rate (Both 1st and 2nd Vaccinations Complete)	End September (around 30%) End December (around 50%) End March (around 75%)	End September (around 40%) End December (around 80%) End March (around 80%)	End September (around 20%) End December (around 30%) End March (around 40%)
States of Emergency Called During FY2021	One (Current state of emergency extended till end of June)		Four times (Same as the left.)
Outlook for Real GDP Growth Rate in FY2021	＋3.1%	＋3.8%	＋2.0%

Source: Produced by DIR.

The future pace of vaccination presents a huge uncertainty factor. We have produced two alternative scenarios here – one in which the pace of vaccination is faster than the main scenario with a vaccination rate of around 80% by the end of December, and one which is slower with a vaccination rate of only around 30% in the same period of time. The scenario with the quicker pace of vaccination sees progress being made in the return to normalcy of economic activity, and sees our economic outlook gaining an upward revision. In this case the real GDP growth rate for FY2021 would be revised upwards from +3.1% q/q annualized in the main scenario to +3.8%. On the other hand, the alternative scenario with a slower pace of vaccination sees an increase in consumer turn-out causing an explosion in infections requiring an additional state of emergency to be declared. The real GDP growth rate would then decline to +2.0%. In Chapter 2 we offer a quantitative examination of the effects of differences in the pace of vaccination on the economy and the spread of infection.

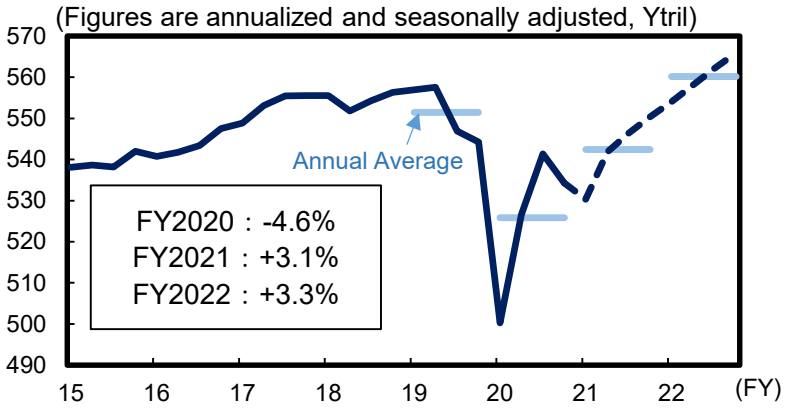
All three of the above economic scenarios assume that the original strain of COVID-19 that entered Japan will be completely replaced by mutant strains by the end of May, and after that point there will be no change in its infectiousness. However, we cannot rule out the possibility that the even more highly infectious strain now spreading in India could spread in Japan and replace current strains. If this occurs, the extent to which economic activity can be continued at the same time measures to prevent the spread of infection are implemented will decline, and all three of these economic scenarios will have to be revised downwards.

Outlook for real GDP according to our main scenario: +3.1% in FY2021, and +3.3% in FY2022

Chart 4 shows changes in real GDP according to the main scenario and the overseas economic outlook that acts as its premise. Outlooks for overseas economies are provided by the latest report (dated May 24) by our area experts.

The real GDP growth rate in 2021 is expected to be +7.3% in the US, +3.9% in the Eurozone, and +8.8% in China. In comparison to the global economic outlook overall, growth is expected to be on the high side in the world's two largest economies – the US and China.

Outlook for Japan's Real GDP and Assumptions Regarding Overseas Economies **Chart 4**



Real GDP Growth Rate in US, Europe & China

US	CY2020 : -3.5% CY2021 : +7.3% CY2022 : +4.2%
Eurozone	CY2020 : -6.7% CY2021 : +3.9% CY2022 : +4.3%
China	CY2020 : +2.3% CY2021 : +8.8% CY2022 : +6.0%

Source: Cabinet Office, various national statistics; compiled by DIR.
Note: The dotted line indicates figures estimated by DIR. Outlooks for the US, the Eurozone and Chinese economies provided by the DIR expert on overseas economies.

In the US, the economy is rapidly recovering, led by personal consumption and housing investment, backed by the Biden administration's expansionary fiscal policy and progress in vaccinations. Real GDP is expected to exceed the level it reached during the Oct-Dec period of 2019 just before the coronavirus crisis by around the Apr-Jun period of 2021. In the Eurozone, real GDP in the Jan-Mar period of 2021 recorded the second consecutive quarter of negative growth due to the effects of the lockdown and other issues, but economic recovery is expected to pick up speed in the Jul-Sep period with the positive effects of the vaccine. Meanwhile, in China, real GDP recorded +18.3% y/y growth in the Jan-Mar period. Comparing with performance seen the same period of 2019 it recorded +10.3% in growth. Infection clusters occurred in certain regions in January this year, but the effects on the economy overall were limited. With high growth seen continuing in the future, additional economic measures in the US are expected to help push up China's exports.

The real GDP growth rate in FY2022 is expected to be at +4.2% in the US, with the Eurozone at +4.3%, and China at +6.0%. With the US and China maintaining relatively high growth rates, the Eurozone, whose recovery had been lagging behind the US and China, is expected to see an increase in growth rate. The Eurozone's real GDP is expected to exceed the level seen just before the coronavirus crisis by around the Apr-Jun period of 2022.

Based on the current situation in the external environment, we expect Japan's real GDP growth rate to be +3.1% in FY2021, and +3.3% in FY2022 (Chart 4). We expect real GDP in the Jul-Sep period, when the third state of emergency is expected to be lifted completely and economic activity restarts, to record growth on the high side at +9.0%. After the first state of emergency was lifted in the spring of 2020, pent-up demand was generated, centering on durable goods. This time around, the suppression of consumption of goods is seen as having been limited, so we do not expect to see much upward pressure on the growth rate coming from pent-up demand. During the Oct-Dec period and beyond, the economy is expected to settle down after its initial reopening, and while measures to prevent the spread of COVID-19 are expected to continue, we see moderate economic growth.

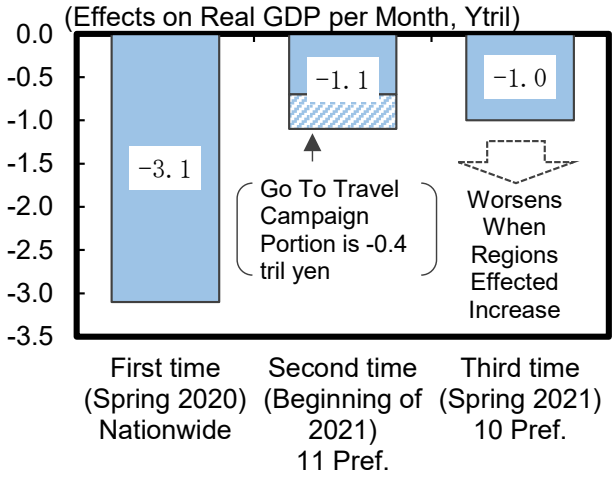
As a result, the real GDP is expected to exceed the level seen just before the coronavirus crisis (the Oct-Dec period of 2019) by around the Jan-Mar period of 2022. Real GDP is expected to hit a historic high, exceeding that of the Jul-Sep period of 2019, by around the Jul-Sep period of 2022.

The effects of states of emergency on the economy, and outlook by demand component

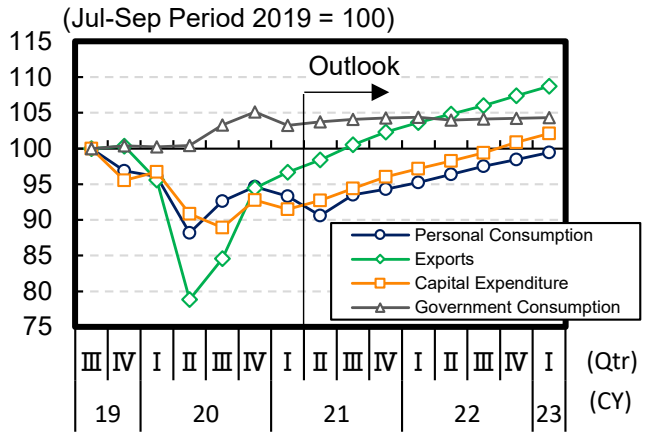
Chart 5 illustrates the effects of the last three states of emergency on Japan's economy. Our estimates are based on the content of the government's request for cooperation during the third state of emergency, and performance of personal consumption during the previous two states of emergency. We estimate the

amount of decline per month in real GDP due to the current state of emergency effecting ten prefectures to total around 1.0 tril yen[3]. This is considerably less than the effects of the first state of emergency (around 3.1 tril yen), but close to the second state of emergency (around 1.1 tril yen[4]). However, if the state of emergency ultimately effects all of Japan's prefectures, it is estimated that it could expand to reach around 1.7 tril yen.

Effects of Declaring States of Emergency on Japan's Economy **Chart 5**



Outlook for Major Components of GDP **Chart 6**



Source: Cabinet Office, Bank of Japan, Ministry of Internal Affairs and Communications; compiled by DIR.
Note: The chart on the left includes the effects of temporarily suspending the Go To Travel Campaign. The effects of the third state of emergency include the effects of the "Special Stricter Measures".

Chart 6 shows the outlook for major components in Japan's GDP according to an index placing the figure 100 as of the Jul-Sep period of 2019. Personal consumption is expected to remain stagnant through the Apr-Jun period due to the state of emergency, but is then expected to recover during the Jul-Sep period once economic activities have reopened. Risk of the spread of COVID-19 will decline as vaccination progresses, and consumption of services associated with risk of infection, such as eating out and travel, are expected to increase their pace of recovery through FY2022. As a result, personal consumption in the Jan-Mar period of 2023 is expected to approach the level it was at during the Jul-Sep period of 2019 when last minute demand was generated prior to the increase in consumption tax.

Capital expenditure declined during the Jan-Mar period of 2021, but exports and production have been in a growth phase since the summer of 2020. One of the major leading indicators, machinery orders (excluding ships and electrical power) shows both manufacturing and non-manufacturing to be in a recovery trend. As for capital expenditure, investment in machinery reflects this trend, showing a continuing recovery phase as seen recently. Even so, capital expenditure shifted into a decline during the Jan-Mar period. This is thought to be due to a reactionary decline after the major growth experienced during the Oct-Dec period (+4.3% q/q), as well as the poor performance of construction investment in the private sector category of the government's Quick Estimate of Construction Investment. During the Jul-Sep period and beyond, both domestic and overseas demand are expected to recover, and capital expenditure is expected to pick up centering on machinery investment and construction investment which had been lagging. As a result, a recovery to nearly the levels seen during the Jul-Sep period of 2019 is expected by around the Jul-Sep period of 2022. Software investment related to digitalization, as well as labor saving & manpower saving, which has maintained underlying strength since before the spread of COVID-19, will continue to be a factor pushing up capital investment.

[3] For details, see the DIR report (Japanese only) by Keiji Kanda and Akane Yamaguchi dated 7 May, 2021, entitled *Outlook for Effects on Japan's Economy of Extension of State of Emergency* (Japanese only).
[4] Includes effects of suspending the Go To Travel Campaign nationwide (around -0.4 tril yen).

Government consumption, which has increased rapidly reflecting the Emergency economic measures and supplementary budget for 2020, shifted into a decline during the Jan-Mar period of 2021 due to the effects of the temporary suspension of the Go To Campaigns and the decrease in visits to doctors' offices. Even so, government consumption exceeded the performance of the Jul-Sep period of 2019 by around 3%, and is expected to continue maintaining a high level of performance. Once we move into FY2022, the risk of the spread of COVID-19 will decline considerably, and measures to respond to the coronavirus crisis will gradually be reduced. On the other hand, Japan will progress further in the direction of a super-aging society, and medical & nursing care benefit payments will increase yearly, bringing further increases in government consumption. Beginning in the spring of 2020, the tendency grew to avoid visits to the doctor's office for fear of contracting COVID-19, but once vaccination progresses, the frequency of doctor's visits will also increase. Government consumption is expected to mark time in FY2022 influenced by both factors leading to growth and those causing decline.

Exports to US and China to lead exports of goods in FY2021, with exports of goods and services to Europe expected to recover in FY2022

With domestic demand stagnant centering on personal consumption, Japan's economy will be led by exports in the meantime. Exports of goods are expected to maintain favorably centering on exports to the US and China, while exports to Europe, which have been lagging behind, are expected to pick up in FY2022 (Chart 7, left). Inbound tourist consumption (just under 5 tril yen in 2019 recorded as exports of services), which disappeared in the spring of 2020, is expected to experience a rapid recovery in FY2022 with the dissemination of vaccines in Japan and around the world.

Container freight rates, which had skyrocketed due to the rapid recovery in transportation demand, are showing signs of peaking (Chart 7, right). Given that world trade volume bottomed out in May 2020 and has continued to expand since then, it seems that freight rates have settled down as the logistics environment has begun to adapt to the corona disaster. This normalization of the trading environment will also support Japan's exports.

Looking at the future of goods exports by region, exports to the US are expected to be strong centering on motor vehicles and parts of motor vehicles. Domestic demand is expected to expand in the US due to increased purchasing power of households thanks to the additional economic measures and progress in vaccination. Exports are expected to increase from the Jul-Sep period onwards against the backdrop of strong demand, but the pace of increase will gradually slow down.

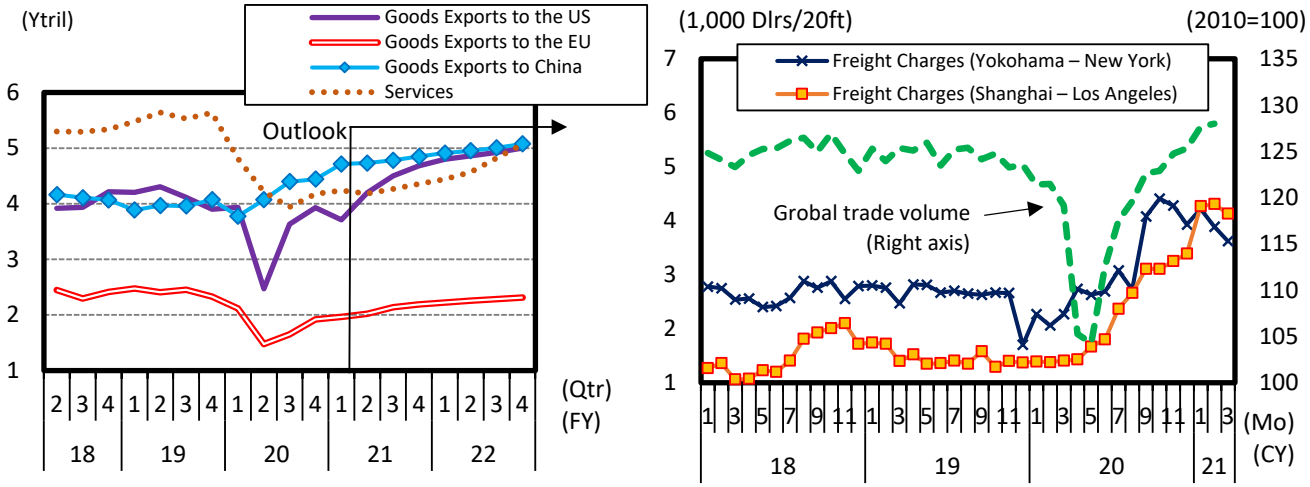
As for exports to Europe, recovery lags behind exports to the US. Most countries in Europe still have measures limiting movement such as lockdowns in place. Even if the EU reaches its target of 70% of adults vaccinated by the summer of 2021, exports to the EU are not expected to fully recover until the Jul-Sep period and beyond. On the other hand, exports are expected to maintain favorable performance once the vaccine has been disseminated, and exports are expected to regain the levels seen before the spread of COVID-19 by the end of 2022.

Exports to China will likely be led by intermediate goods and capital goods. China's domestic production activities are expected to be revitalized as the global economy recovers, and this is expected to lead to growth in Japan's exports of capital goods to China. Meanwhile, investment in fixed assets in China is maintaining favorable performance, and demand for materials such as nonferrous metals is expected to provide underlying support for Japanese exports to China. However, we should take care here as the Chinese government's restrictive policy as regards investments in real estate development could result in holding down demand for investments in infrastructure.

One factor that brings downside risk for exports is the shortage in semiconductors, which creates supply constraints. Toyota Motor just recently decided to implement production cuts at its domestic factories for the first time. Until now, Toyota had managed to avoid the negative effects of the shortage in

semiconductors. Production cuts by domestic manufacturers such as motor vehicles are expected to continue in the future. It is very likely that there will be lost opportunities due to the production constraints. However, considering the underlying strength in demand for motor vehicles in overseas markets, recovery production and exports can be expected once the supply constraints are removed. Negative effects are expected to be minor when averaged over the mid to long-term.

Outlook for Japan's Real Exports (Left); Global Trade Volume & Freight Charges (Right) **Chart 7**



Source: Bank of Japan, Ministry of Finance, Ministry of Internal Affairs and Communications, Netherlands Bureau for Economic Policy Analysis, Japan Maritime Center, National Bureau of Statistics of China, Eurostat, BEA, FRB, Haver Analytics; compiled by DIR.
Note: Figures for real exports and global trade volume are seasonally adjusted.

2. Simulation: The Pace of Vaccination

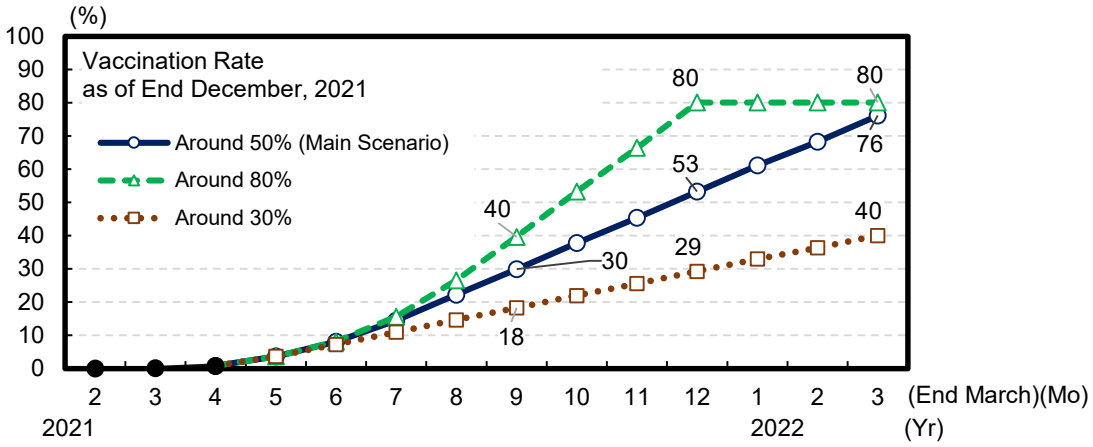
Our main scenario sees around half of Japan's population being vaccinated by the end of December

As was explained in the previous chapter, our main economic scenario assumes that the percentage of persons having completed both the first and second vaccinations, which was at 1.9% as of May 19, is expected to be at around 30% by the end of September, and around 50% by the end of December.

Our two alternate scenarios, one with a faster pace of vaccination than the main scenario and one with a slower pace, are shown in Chart 8. According to the faster paced scenario, the vaccination rate is estimated to grow to around 40% by the end of September, reaching 80% by the end of December. Persons aged 16 and older are eligible to be vaccinated, accounting for just under 90% of Japan's total population. Considering the fact that there are people with pre-existing medical conditions preventing them from being vaccinated, as well as those who decide to avoid being vaccinated due to worries regarding its safety and the possibility of adverse events, the actual percentage of the population who wish to be vaccinated would reach around the level of 80% once vaccination has been completed.

As for the scenario in which the pace of vaccination is slow, the vaccination rate is seen at around 20% by the end of September, reaching around 30% by the end of December, gradually rising to around 40% by the end of March, 2022. The vaccination rate rose by nearly 0.5%pt during the three days between May 16 and May 19 this year. If vaccination continues at this pace, the vaccination rate will reach over 50% by the end of March, 2022. The slow scenario is even slower than this pace, and is hence built on very pessimistic assumptions. Factors which could lead to a slower pace of vaccination include problems in preparing the vaccination infrastructure, shipments of the vaccine being late, and the possibility that the vaccine may not be effective enough, so that people are required to be re-vaccinated later.

Vaccination Rate Assumptions (Percentage of People Having Completed Vaccination) **Chart 8**



Source: Oxford University "Our World in Data"; compiled by DIR.
Note: Percentage of people having completed the required number of vaccinations.

Scenario with slower pace of vaccination sees total of four states of emergency in FY2021

The results of our simulation using the three sets of assumptions regarding the pace of vaccination described above are shown in Chart 9. Results show the number of persons infected, the number of deaths, and real GDP growth rate expected in the future according to each scenario.

The effective reproduction number, which indicates how many people are infected from one infected person, tends to lag behind consumer turn-out at retail stores and entertainment facilities as shown in Chart 2 by about two weeks.

We put together an estimation formula to explain the effective reproduction number for Tokyo, using consumer turn-out and temperature at retail stores and entertainment facilities for the previous two weeks, and considering the influence of mutant strains that began spreading around the spring of 2021[5]. Using this data, we estimated the future number of newly infected people per day in Tokyo.

As was explained in the previous chapter, our estimates assume that the third state of emergency will be extended until the end of June. As was pointed out in the DIR report by Keiji Kanda and Akane Yamaguchi dated 7 May 2021 entitled *Outlook for Effects on Japan's Economy of Extension of State of Emergency* (Japanese only), if the state of emergency is lifted at the end of May, the number of new infections per day will exceed 1,000 by summer, and this would require yet another extension. As for consumer turn-out during the state of emergency, considering the fact the in the past the tendency has been for turn-out to gradually increase as the state of emergency drags on, we can assume that similar behavior will be seen as we draw closer to the end of June when the state of emergency is lifted (Chart 9, top left).

According to the main scenario (vaccination rate of around 50% as shown in the chart), consumer turn-out is expected to be kept under control through the fall of 2021 while the vaccination rate remains low (maintaining the level seen before the third declaration of emergency), after which it will gradually recover. As the effects of the vaccine increase, an explosion in infections is expected to be avoidable, even when consumer turn-out in Tokyo recovers to the levels seen before the spread of COVID-19 began by the end of FY2021 (Chart 9, top right).

According to the scenario in which the pace of vaccination is faster (vaccination rate of around 80% as shown in the chart), dissemination of the vaccine will allow the level of economic activity to increase rapidly while at the same time allowing for prevention of the spread of infection. Consumer turn-out in Tokyo is expected to recover to the levels seen before the spread of COVID-19 began by the middle of December. Even so, no explosion in infections should occur. Normalization of economic activity will progress, and the real GDP growth rate for FY2021 will exceed the +3.1% q/q annualized according to the main scenario to record +3.8%, achieving a strong economic recovery (Chart 9, bottom left).

Meanwhile, in the scenario with the slower pace of vaccination (vaccination rate of around 30% as shown in the chart), the recovery of consumer turn-out will bring upward pressure on the effective reproduction number exceeding the vaccine's effect of suppressing the disease. This will generate explosions in infections three times during FY2021 (Chart 9, top right). This will require the declaration of states of emergency several times during the year[6], causing the FY2021 real GDP growth rate to decline to +2.0% q/q annualized. In contrast to the main scenario, the number of people infected is expected to rise by around 30,000, and deaths are expected to grow by around 600 (Chart 9, bottom right). Moreover, suicides due to economic hardship are expected to increase[7].

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[5] Dummy variables have been added to the estimation formula, increasing by 1 per day from March till June, after which it remains flat. The effective reproduction number as of the end of April based on the estimation formula is about 1.1 times that when the spread of mutant strains is not taken into consideration. According to the analysis of the National Institute of Infectious Diseases, the effective reproduction number of the British mutant strain is 1.32 times that of the conventional strain. In addition, according to the 34th Coronavirus Infection Control Advisory Board document (May 12, 2021), in 64% of cases in Tokyo between April 26 and May 2 the conventional strain had been replaced by mutant strains. Considering that this includes mutant strains other than the British type, our estimation results are considered to be generally consistent with this analysis.

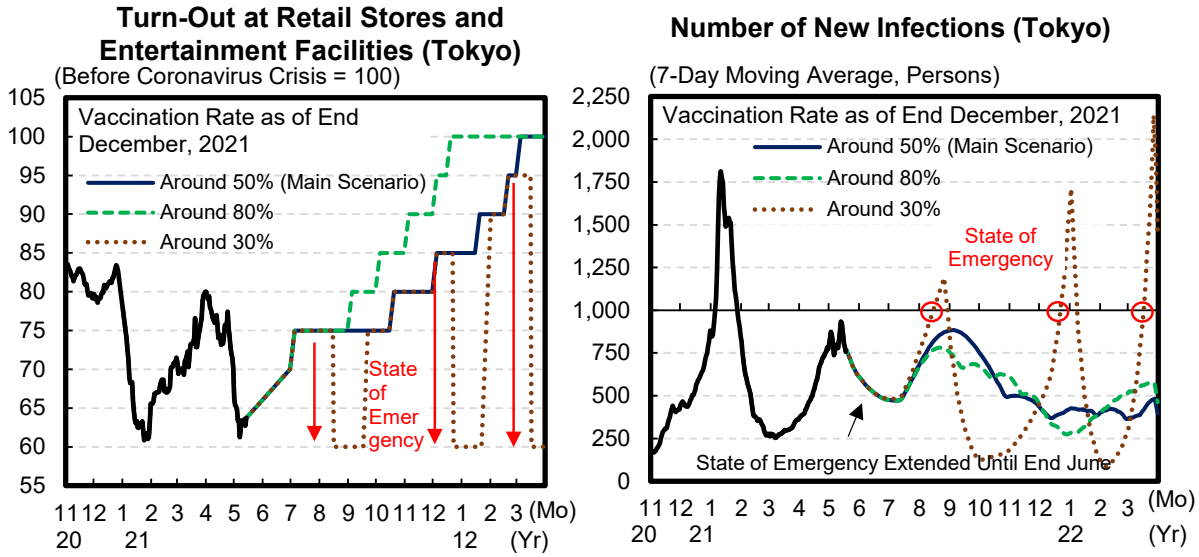
[6] When the second declaration was issued in January 2021, the number of new infections per day was about 1,000 in Tokyo. Our estimate assumes that a declaration of emergency is issued when the number of new infections per day exceeds 1,000 according to the 7-day moving average, and lifted when the 7-day moving average falls below the stage 2 standard of 300.

[7] It has been found that whenever the unemployment rate has risen by 1%pt between 1998 – 2019, there has been a correlation with growth in suicides caused by economic difficulties and daily life problems, which have grown by around

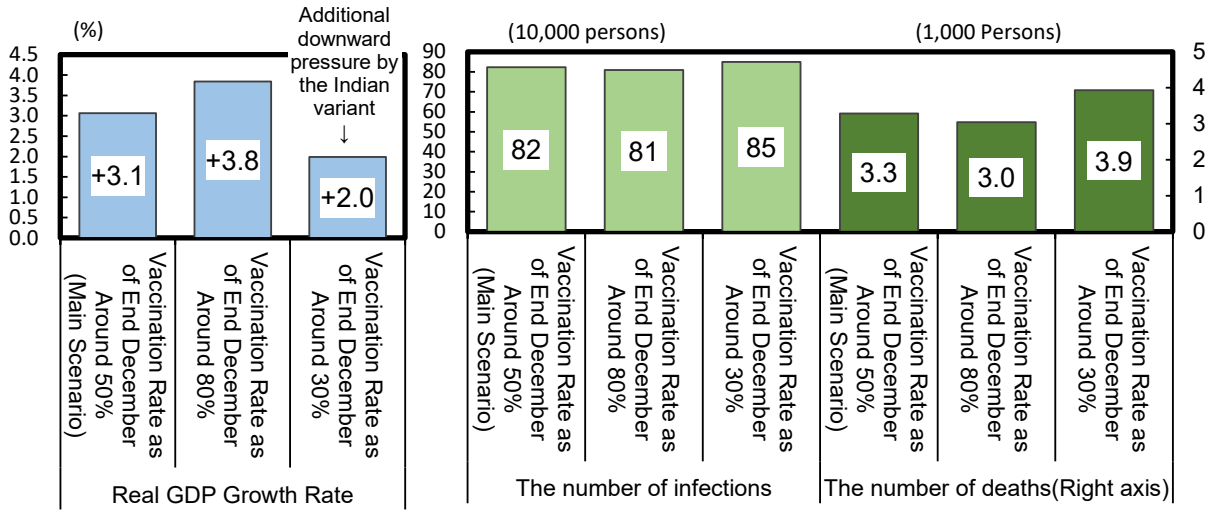
These simulations do not make any assumptions about what might happen if the Indian variant of COVID-19, which is said to be more highly infectious than other mutant strains, gets into Japan and begins to spread. However, if vaccination proceeds too slowly and this situation does occur in Japan, the number of people infected and the number of deaths will likely increase, and this could bring further downward pressure on the real GDP growth rate in FY2021, pushing it down considerably below +2.0% q/q annualized. It is therefore necessary to remain cautious regarding the spread of highly infectious mutant strains of COVID-19.

1,800. Based on this fact we can estimate that a decline of 1.1%pt in the real GDP growth rate will lead to an increase of 900 suicides due to economic hardship.

Consumer Turn-Out, Number of New Infections, Number of Deaths, and Real GDP Growth Rate According to Each Scenario — Chart 9



Real GDP Growth Rate, Number of New Infections, Number of Deaths (FY2021, Nationwide)



Source: Ministry of Health, Labour and Welfare, Google, CEIC, Japan Meteorological Agency, Bank of Japan, Cabinet Office; compiled by DIR.

Notes: 1) The benchmark for turn-out at retail stores and entertainment facilities is the median value per day of the week between January 3 and February 6, 2020. Data from holidays occurring on weekdays and year-end/Japanese New Year (December 28, 2020 to January 4, 2021) are not included.

2) The number of new infections was calculated after estimating effective reproduction number. We use a simple equation introduced by Toyo Keizai Inc. for effective reproduction number (Supervised by Professor Hiroshi Nishiura, Kyoto University Graduate School of Medicine):
Effective reproduction number = (number of new positives during last 7-days/number of new positives during the previous 7-days) ^ (mean generation time 5-days/ report interval 7-days).
The equation for estimating the effective reproduction number is as follows. We used daily temperature from 2020 for the temperature data portion of the estimate:
log (effective reproduction number) = 1.58 x log (turn-out at retail stores and entertainment facilities (-14)) – 0.04 x log (average temperature (-14)) + 0.002 x (fixed dummy variable increasing by 1 per day after March remaining same after June) – 6.69
The estimation period was between September 1, 2020 and May 18, 2021. Variable and constant terms all had significance of 1%. The coefficient of determination was 0.65.

3) Our estimate assumes vaccination occurs twice, and that 90% of twice vaccinated people, after which there is no possibility of infection.

4) The real GDP growth rate per each scenario was estimated after first estimating the rate of deviation of consumption from the main scenario. Considering the relationship between consumption and consumer turn-out at retail stores and entertainment facilities, as well as trends in the service industry according to the consumption activity index, we performed our estimate after converting the data into a GDP-based amount.

5) As for the number of infections nationwide, considering the relationship to the recent number of infections in Tokyo, we estimated this number by quadrupling the number of infections in Tokyo. We based our estimate of the death rate on the 0.96% recorded between June and August of 2020, and assumed the cumulative death rate of persons under the age of 50 would decline to 0.07% as vaccination of the elderly progresses.

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		2020			2021				2022				2023	FY2020	FY2021	FY2022
		Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar			
Real GDP	Q/q %; annualized	-28.6	22.9	11.6	-5.1	-2.9	9.0	3.4	2.9	2.7	3.0	2.9	2.7			
	Y/y	-10.1	-5.6	-1.1	-1.9	6.0	2.9	1.0	3.1	4.5	3.0	2.9	2.8	-4.6	3.1	3.3
Private spending	Q/q %; annualized	-29.2	22.0	9.0	-5.4	-11.1	13.4	3.3	4.0	4.9	4.8	3.9	3.9	-6.0	1.3	4.8
Private housing investment	Q/q %; annualized	2.3	-21.0	0.3	4.5	1.8	2.0	2.4	2.4	2.2	2.2	2.1	2.0	-7.1	0.7	2.2
Capex	Q/q %; annualized	-22.3	-8.1	18.3	-5.5	5.6	7.4	7.0	4.9	4.7	4.7	6.1	4.9	-6.9	4.6	5.3
Government final consumption	Q/q %; annualized	0.7	11.9	7.3	-6.9	1.9	1.2	0.8	0.4	-1.4	0.4	0.4	0.4	3.1	1.1	0.1
Public investment	Q/q %; annualized	8.9	2.9	4.7	-4.2	2.5	2.5	0.4	0.6	0.6	0.2	0.2	0.2	4.0	1.1	0.5
Exports	Q/q %; annualized	-53.7	32.5	55.7	9.7	7.4	8.9	7.3	5.3	4.5	4.6	5.3	5.1	-10.4	14.1	5.4
Imports	Q/q %; annualized	-2.6	-29.0	20.7	16.8	-3.2	7.0	6.0	6.6	7.1	7.8	7.4	7.0	-6.8	4.8	7.0
Nominal GDP	Q/q %; annualized	-27.7	24.1	10.0	-6.3	-2.9	10.1	4.0	3.5	3.3	3.7	3.9	3.7	-4.0	3.1	4.0
GDP deflator	Y/y	1.4	1.2	0.2	-0.2	-0.5	-0.4	0.0	0.5	0.7	0.6	0.7	0.8	0.6	-0.1	0.7
Industrial production	Q/q	-16.8	9.0	5.7	2.8	1.8	2.8	2.6	1.7	1.3	1.5	1.8	1.7	-9.5	13.2	7.2
Core CPI	Y/y	-0.1	-0.2	-0.9	-0.4	-0.0	0.0	0.1	-0.5	0.2	0.3	0.8	1.2	-0.4	-0.1	0.6
Unemployment rate	%	2.7	3.0	3.0	2.8	2.8	2.9	2.9	2.8	2.7	2.6	2.5	2.4	2.9	2.8	2.5
Trade balance (goods, services)	Y tril; annualized	-5.9	4.9	9.7	5.8	7.2	8.1	8.3	8.1	7.7	7.3	7.0	6.6	3.9	7.9	7.1
Current account balance	Y tril; annualized	8.7	16.4	25.6	20.2	21.9	22.2	22.7	22.5	21.8	21.1	20.6	20.2	18.2	22.9	21.4
Major assumptions																
Crude oil price (WTI futures)	$/bbl	28.0	40.9	42.7	58.1	63.9	65.0	65.0	65.0	65.0	65.0	65.0	65.0	42.4	64.7	65.0
Exchange rate	Yen/$	107.6	106.1	104.5	105.9	109.0	109.0	109.0	109.0	109.0	109.0	109.0	109.0	106.0	109.0	109.0

Source: Compiled by DIR.
Note: GDP through Jan-Mar 2021: actual; thereafter: DIR estimates.