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BASIC STATISTICS OF JAPAN, 2019*

(Numbers in parentheses refer to the OECD average)**

LAND, PEOPLE AND ELECTORAL CYCLE					
Population (million)	126.3		Population density per km² (2018)	346.4	(38.4)
Under 15 (%)	12.6	(17.9)	Life expectancy at birth (years)	84.4	(80.2)
Over 65 (%)	28.0	(17.1)	Men	81.4	(77.6)
International migrant stock (% of population)	2.0	(13.2)	Women	87.4	(82.9)
Latest 5-year average growth (%)	-0.2	(0.6)	Latest general election	October 2021	
ECONOMY					
Gross domestic product (GDP)			Value added shares (%, 2018, OECD: 2019)		
In current prices (billion USD)	5 134.4		Agriculture, forestry and fishing	1.2	(2.7)
In current prices (trillion YEN)	559.8		Industry including construction	29.2	(26.6)
Latest 5-year average real growth (%)	0.9	(2.2)	Services	69.6	(70.6)
Per capita (000 USD PPP)	42.8	(47.6)			
GENERAL GOVERNMENT (Per cent of GDP)					
Expenditure	38.2	(40.6)	Gross financial debt	223.0	(108.9)
Revenue	35.3	(37.5)	Net financial debt	123.4	(67.9)
EXTERNAL ACCOUNTS					
Exchange rate (YEN per USD)	109.03		Main exports (% of total merchandise exports)		
PPP exchange rate (USA = 1)	103.63		Machinery and transport equipment	58.2	
In per cent of GDP			Chemicals and related products, n.e.s.	11.2	
Exports of goods and services	17.4	(53.6)	Manufactured goods	11.0	
Imports of goods and services	17.7	(50.0)	Main imports (% of total merchandise imports)		
Current account balance	3.4	(0.3)	Machinery and transport equipment	28.2	
Net international investment position	65.1		Mineral fuels, lubricants and related materials	21.3	
			Miscellaneous manufactured articles	14.0	
LABOUR MARKET, SKILLS AND INNOVATION					
Employment rate (aged 15 and over, %)	60.7	(57.5)	Unemployment rate, Labour Force Survey (aged 15 and over, %)	2.4	(5.4)
Men	69.7	(65.6)	Youth (aged 15-24, %)	3.8	(11.8)
Women	52.2	(49.9)	Long-term unemployed (1 year and over, %)	0.8	(1.3)
Participation rate (aged 15 and over, %)	62.0	(60.9)	Tertiary educational attainment (aged 25-64, %)	52.7	(38.0)
Average hours worked per year	1,644	(1,743)	Gross domestic expenditure on R&D (% of GDP, 2018)	3.3	(2.6)
ENVIRONMENT					
Total primary energy supply per capita (toe)	3.3	(3.9)	CO_2 emissions from fuel combustion per capita (tonnes)	8.4	(8.3)
Renewables (%)	6.2	(10.8)	Water abstractions per capita (1 000 m³, 2017)	0.6	
Exposure to air pollution (more than 10 µg/m³ of PM 2.5, % of population)	97.6	(61.7)	Municipal waste per capita (tonnes, 2018, OECD: 2019)	0.3	(0.5)
SOCIETY					
Income inequality (Gini coefficient, 2015, OECD: 2016)	0.334	(0.318)	Education outcomes (PISA score, 2018)		
Relative poverty rate (%, 2018, OECD: 2017)	15.7	(11.7)	Reading	504	(487)
Median disposable household income (thousand USD PPP, 2018, OECD: 2017)	21.7	(24.2)	Mathematics	527	(489)
Public and private spending (% of GDP)			Science	529	(489)
Health care	11.0	(8.8)	Share of women in parliament (%)	10.1	(30.7)
Pensions (2017)	9.7	(8.1)	Net official development assistance (% of GNI, 2017)	0.2	(0.4)
Education (% of GNI)	2.7	(4.4)			

* The year is indicated in parenthesis if it deviates from the year in the main title of this table.

** Where the OECD aggregate is not provided in the source database, a simple OECD average of latest available data is calculated where data exist for at least 80% of member countries.

Source: Calculations based on data extracted from databases of the following organisations: OECD, International Energy Agency, International Labour Organisation, International Monetary Fund, United Nations, World Bank.

Executive summary

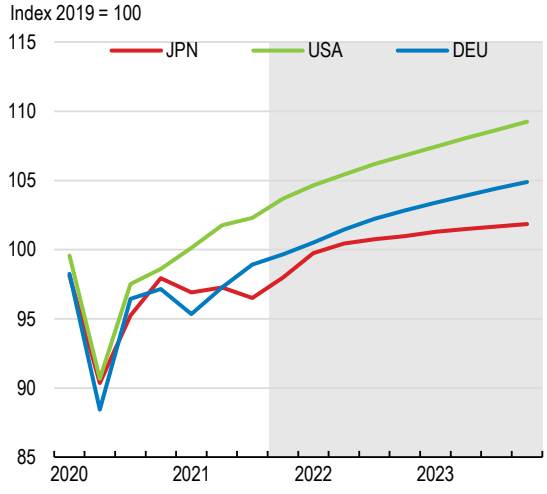
The pandemic set back positive developments

The COVID-19 pandemic hit the economy hard, provoking a marked downturn. The economy is recovering, supported by macroeconomic policies and progress in addressing infections.

Infections proved difficult to bring under control. The government reacted to waves of infections by introducing confinement measures, which with behavioural changes kept infection rates relatively low. However, pressure on the health service was intense in some parts of the country. Vaccination started relatively slowly, but by mid-year the pace had picked up substantially.

Output dropped and the recovery has been relatively modest. Economic activity tumbled in Spring 2020 as sanitary restrictions restrained consumption and investment. Government support and the reopening of the economy led to a partial bounce back, but difficulties in containing infections held back growth in the first half of 2021 (Figure 1). Employment contracted sharply and weak wage growth depressed household income.

Figure 1. The recovery is relatively sluggish



Source: OECD Economic Outlook No. 110 database.

StatLink https://stat.link/q1sozp

Growth is on course to regain momentum. As sanitary conditions improve and vaccination coverage increases, the economy is set to strengthen (Table 1). Private consumption growth will remain subdued given sluggish wages. Exports rebounded as major trading partners recovered and are set to remain firm. The recovery in industrial production coupled with government support will lift investment. A weak recovery and temporary downward pressures on prices will likely keep inflation below target for some time.

Table 1. Exports have rebounded strongly

	2020	2021	2022	2023
Gross domestic product	- 4.6	1.8	3.4	1.1
Private consumption	- 5.8	1.3	4.2	1.7
Gross fixed capital formation	- 4.2	- 0.6	4.4	1.9
Exports	- 11.7	11.3	4.3	3.4
Imports	- 7.3	6.0	4.9	2.6
Unemployment rate	2.8	2.8	2.6	2.4
Inflation (CPI)	0.0	- 0.2	0.8	0.8
Current account balance (% of GDP)	2.9	3.2	2.5	2.5
General government budget balance (% of GDP)	- 9.5	- 6.4	- 6.9	- 3.1

Source: OECD Economic Outlook No. 110 database.

Risks remain sizeable. Vaccinations are making progress, but losing the race against new variants could result in renewed states of emergency being declared delaying the recovery. This would aggravate scarring effects, particularly if the current cohort fails to make a successful transition from school and university into employment.

Macroeconomic policies reacted swiftly and forcefully

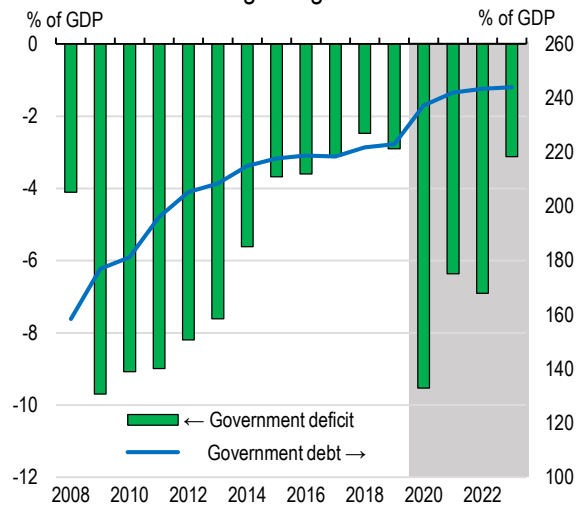
Macroeconomic policies are supportive and stimulus will become more targeted and withdrawn once the economy has emerged from the pandemic.

Fiscal policy reacted robustly. A variety of measures supported households and businesses affected by the pandemic, notably the Employment Adjustment Subsidy, cash benefits for SMEs and concessional loans. These measures successfully kept unemployment low and prevented widespread firm failure while containing the spread of infection. In addition, new economic measures, which focus on growth and distribution, were adopted after a new administration was formed in October 2021. However, they led to a ballooning budget deficit in 2020, pushing up debt to unprecedented highs (Figure 2). As the economy regains momentum, fiscal policy is rebalancing towards more targeted

policies that will both underpin domestic demand and improve productivity or meet environmental targets.

Figure 2. Fiscal policy reacted robustly

Government net lending and gross financial liabilities



Source: OECD Economic Outlook No. 110 database.

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Monetary policy has been supportive. The Bank of Japan reacted quickly, ensuring that monetary and financial policy was supportive and provided ample liquidity to stabilise markets and support for lending. The impact of the pandemic and one-off price reductions and subsidies led CPI inflation into negative territory before it picked up to around zero. Inflation is projected to increase gradually but remain below target for the foreseeable future. In these conditions, monetary policy will remain accommodative.

Financial vulnerabilities are largely structural. Bank lending rose rapidly during the pandemic as firms' needs for working capital surged. The banking sector appears reasonably well capitalised and able to withstand further shocks. Some of the pandemic-induced lending is backed by government schemes. However, regional banks appear weaker and have been struggling in recent years. Efforts to restructure and merge these banks will strengthen overall financial sector resilience.

Securing long-run sustainability

A combination of fiscal consolidation and structural reforms will be needed to ensure long-run sustainability. Policies that raise productivity growth, boost labour force participation, and allow for gains in public spending efficiency would help bring debt levels down to more manageable levels by mid-century.

Fiscal consolidation was knocked off course. The deterioration of the budget comes after a period of sustained reductions in primary deficits. As the economy regains traction, further action will be needed to secure long-term fiscal sustainability.

Social security spending and ageing-related spending for health and long-term care are rising. Gross government debt is set to rise further GDP by 2050 without corrective action. Consolidation efforts that raise additional revenue by increasing the consumption and carbon tax rates gradually would help stabilise debt in the medium term, but underlying spending pressures would then see debt levels rising once again.

Past labour market reforms have successfully raised employment, more than offsetting ageing's impact on the size of the working-age population. But the pandemic has set this progress back and helping workers into employment would minimise scarring effects. Employment and wellbeing could be raised further by reducing labour market dualism. Planned reforms to pensions would help in this respect. Labour supply could also be lifted by reducing disincentives in pension and health insurance for spouses.

Productivity in the business sector has been sluggish, particularly in business services and smaller firms. Business dynamism, which spurs productivity gains by encouraging firm entry and subsequent growth and the exit of less productive firms, is weak compared with other countries. The structure of support for SMEs and personal bankruptcy rules act as impediments in this regard.

Environmental policy objectives have become more ambitious. The government has committed to a target of net zero greenhouse gas emissions by 2050 and an intermediate target for 2030. Meeting these objectives will be challenging. Renewables' contribution to electricity supply is modest in comparison with other countries and is constrained by limited integration of regional power grids. Other potential contributions from innovative technologies, such as hydrogen and ammonia and

carbon capture and storage are still nascent and relatively expensive. Thus far, limited use has been made of market-based instruments. A carbon tax is in use, but the rate is rather low. That said, energy costs are relatively high.

Digital transformation to boost the economy

Pursuing the digital transformation may also help boost productivity growth and secure fiscal sustainability. The country is well placed to benefit from digitalisation, enjoying good infrastructure and skills, though complementary investments are also needed.

The physical infrastructure is good and skills are elevated. In addition, firms are world leaders in digital technologies and students rank well in international comparisons of skills. However, the pandemic revealed weaknesses as households, firms and government struggled to make use of digital technologies. Complementary investments would help harness the full power of digitalisation.

While the foundations are in place, government use of digital tools is limited. The government has made progress in developing competency and digital tools. However, the use of these government services remains comparatively low. Reliance on paper and even stamps remains widespread (Figure 3). The recent initiative to establish a Digital Agency in the centre of government will help create impetus for other parts of government.

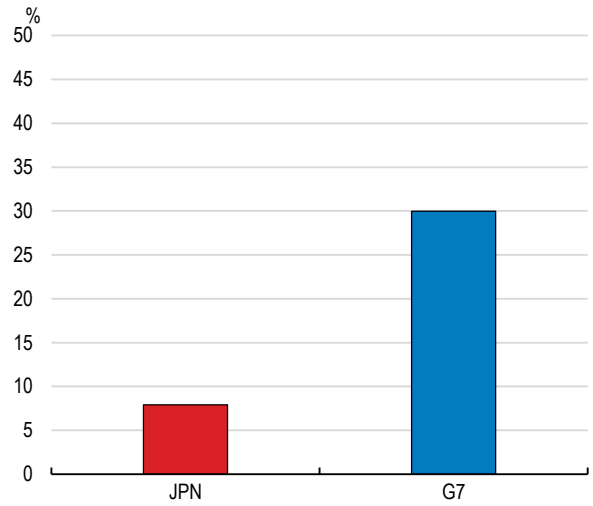
Digitalisation can boost public service provision. Experience in trials and differences in the adoption of digital tools across the country suggest that gains in public spending efficiency are available in diverse areas such as health and long-term care, transportation and public investment. Better tailored services can be provided and transaction costs reduced markedly by making better use of digital information and technologies.

Private sector digitalisation is mixed. In some sectors, notably manufacturing, digitalisation is amongst the most advanced worldwide, but there are wide variations elsewhere with business services and smaller enterprises often being less well placed.

Investment in complementary and intangible assets is often lacking. Investment in ICT technologies and the intangible assets to make best use of new technologies is very concentrated. Weak business dynamism hinders the diffusion of new technologies and management methods.

Figure 3. Digital government use is limited

Individuals using the internet to submit filled forms to public authorities' websites, 2019



Source: OECD, ICT Access and Usage by Households and Individuals database.

StatLink https://stat.link/eb1vau

Digitalisation is changing skill needs. The school system performs well in many areas, but digital skills are weaker. In part, schools have lacked the investments and training to incorporate new technology into their curricula. At university level, relatively few students study STEM disciplines, particularly women.

Retraining workers becomes more important in an era of disruptive change. As the share of non-standard employment has risen, ensuring training needs are met becomes more difficult. Government support for adult and continuing training, together with promoting more mid-career labour mobility, would help raise incentives for individuals to invest in training.

MAIN FINDINGS	KEY RECOMMENDATIONS
Getting beyond the pandemic	
Even though infection rates are small by international comparison, several waves of infections have put pressure on the health sector.	Continue to roll out vaccinations and support the health sector's ability to react to infections.
The economy is gradually recovering but remains weak and is exposed to further shocks. Government emergency support has made extensive use of loan guarantees in supporting firms.	Continue to restructure support towards demand-supporting structural reforms that will benefit the economy in the longer run.
Inflation veered down before picking up again, but continues to run under target.	While inflation remains below target, maintain the current accommodative monetary policy stance to support economic recovery.
Against the backdrop of a long period of low interest rates and demographic change, some financial risks have emerged, including in relation to foreign currency funding and regional banks.	Financial supervisors need to remain vigilant with regard to liquidity and funding risks.
Securing long-term fiscal sustainability	
Gross debt stands at unprecedented levels. Without corrective action, fiscal policy is unsustainable in the long run.	Elaborate a roadmap to realise a primary surplus in a comprehensive plan to achieve longer-term sustainability. Once the economy has recovered, gradually raise revenues, including by increasing the consumption tax rate further by small increments on a more regular basis.
Securing long-term environmental sustainability	
Climate change objectives are challenging and will require major investment and public support in developing technologies that can contribute to emission reduction or carbon capture and storage. Initiatives are being trialled in a large number of areas. Some of the proposed possible emission reductions are not yet cost effective.	Elaborate an emission reduction plan with a concrete and feasible timetable, including for the investments needed to adjust the energy mix and meet the zero net emission target. Make greater use of market-based instruments, such as the carbon tax, a trading system or carbon-credit market, while taking into account the social and economic impact, as part of the wider strategy that also includes investment and regulation.
The energy system remains highly fragmented, which limits the options for expanding the contribution of renewables to electricity supply.	Invest in more interconnector capacity and ensure regional electricity grids support an increase of renewable electricity supply.
Boosting productivity and labour supply	
Demographic pressures will weigh on the outlook reducing the inflow of new workers. Labour market reforms had been boosting participation and employment of the elderly and women, but the pandemic has led to job losses. Digitalisation will call for new skills, which older and low-skilled workers need support in acquiring.	Act to strengthen labour supply further. Continue *Work style* reforms including equal pay for equal work and flexible working arrangements with improving child-care provision to boost female labour force participation. Continue to raise the compulsory retirement age or abolish it.
Productivity growth has been lacklustre overall. Business dynamism is weak with relatively few start-ups and exits of low-productivity (often smaller) firms. Investment in ICT and complementary intangible assets has been largely concentrated in larger enterprises.	Increase targeted spending on R&D, investment and education and training to boost productivity growth. Encourage mergers, acquisitions and divestitures of SMEs in the face of labour shortages to promote consolidation of managerial resources in viable firms.
Making the most of digital transformation	
Government use of digital technologies is underdeveloped and it struggled to use them during the pandemic to deliver public services. Databases are currently fragmented and difficult to link.	Develop base registries to link government databases. Address regulatory and privacy issues to facilitate greater use of digitalisation. Raise e-government supply, service orientation and cost efficiency in the public sector, for instance by building on private sector expertise.
Investment in ICT and digital technologies is weak, particularly in small firms and the business services sector. New firm creation is weak and the number of female entrepreneurs is small.	Continue to develop financing methods serving firms with high shares of intangible capital. Expand access to entrepreneurial training and finance, in particular for women.
Skills being developed in the education sector are not aligned to the economy's needs.	Reform STEM curricula to make them more attractive to study. Provide training and support for teachers to integrate ICT into their lessons.
Comparatively few women take STEM courses.	Promote greater female participation in STEM disciplines, such as through mentor programmes.
A sizeable share of workers have limited access to firm-sponsored training and will struggle as digitalisation changes job tasks.	Continue to work with companies to reform seniority wage schemes and promote mid-career hires.

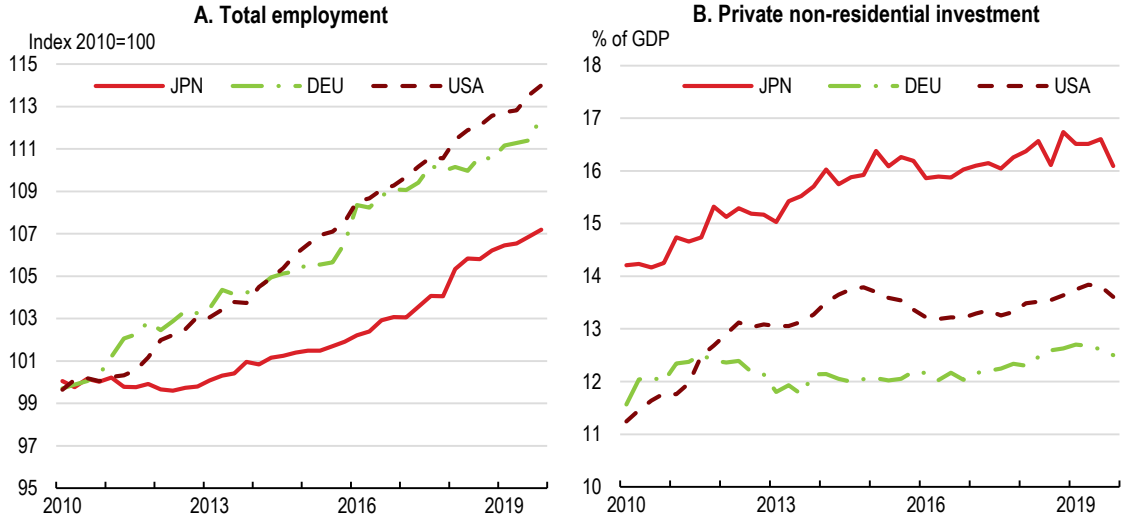
1 Key Policy Insights

The pandemic set back positive structural developments

While Japan has successfully contained the number of infections, the pandemic has proved difficult to bring under control. Successive waves of infections induced the government to introduce states of emergencies, which became more targeted over time. Confinement measures and behavioural changes kept transmission rates relatively muted, but at some near-term cost to the economy. After the initial shock, the economy has struggled to regain its footing, even though fiscal and monetary policy reacted quickly and robustly to offset the impact on households and businesses.

The pandemic hit when the effects of past structural reforms to boost employment and to adjust regulation to improve the business environment were starting to show. Despite the headwinds created by an ageing and shrinking population, the level of employment had been rising as elderly individuals remained in work and more women participated (Figure 1.1, Panel A). Business fixed investment had strengthened somewhat and productivity growth, which had long been anaemic, showed signs of picking up (Panel B). This progress was set back as the pandemic caused output and employment to fall and unemployment to rise. The pandemic also exposed weaknesses, some of which have been long-standing concerns. For example, labour market duality meant that despite aggregate income gains income inequality did not decline, although poverty rates were diminishing slowly, and low-paid and temporary workers were more exposed to the downturn. Other weaknesses, such as the difficulties households, businesses and government experienced in adapting to remote working had heretofore been less in focus. The government reaffirmed the commitment to furthering structural reforms, with a greater emphasis on the digital transformation and climate change.

Figure 1.1. Employment and investment had been picking up



Source: OECD, Labour force statistics; and OECD, National Accounts.

StatLink https://stat.link/ruc6y5

Against this background, the key messages of this *Survey* are:

- The economy is recovering as the pace of vaccinations picks up. Growth will strengthen eventually allowing monetary and fiscal authorities to reduce their support to the economy and focus more on structural changes that will sustain growth in the longer term. In particular, avoiding the types of scarring that occurred after previous downturns will be important.
- The pandemic pushed up public debt to even higher levels and the country faces mounting budget pressures from a rapidly ageing and shrinking population. Fiscal sustainability needs to be secured in the longer run and actions taken to improve the state of public finances and push forward with reforms to boost productivity and participation. Longer-term sustainability also requires bringing greenhouse gas emissions down in line with government targets. Achieving these targets may require extra public spending or weigh on economic growth, depending on the approach adopted.
- Improving economic and social outcomes calls for further structural reforms. Progress in digital transformation would boost productivity while offering households better and more targeted services. Many of the preconditions for the successful use of digital tools are in place, but complementary investments in hardware and human capital are needed.

The policy response helped keep cases relatively low

After Japan's first case of COVID-19 was confirmed on 16 January 2020, the number of cases gradually increased (Figure 1.2). The government requested schools to close in March, and then declared a state of emergency in April. Under Japan's Constitution, this merely allows prefectural governors to request school closures, restrict the use of public facilities and request non-essential businesses to close, but not to impose curfews or similar impingements on individuals. Even so, the effect was large given people's changes in behaviour and a successful information campaign promoting the avoidance of the "three Cs" (closed spaces, crowded places and close-contact settings). In addition, normal sanitary measures in Japan, such as wearing masks and regular hand washing, helped early on. As a result, the rate of infections and deaths in Japan is relatively low (Figure 1.2). The largely voluntary confinement contributed to a dramatic drop in economic activity as businesses closed or shifted to telework and households shielded themselves. This helped bring the spread of the coronavirus under control while the capacity for testing and medical care was stepped up.

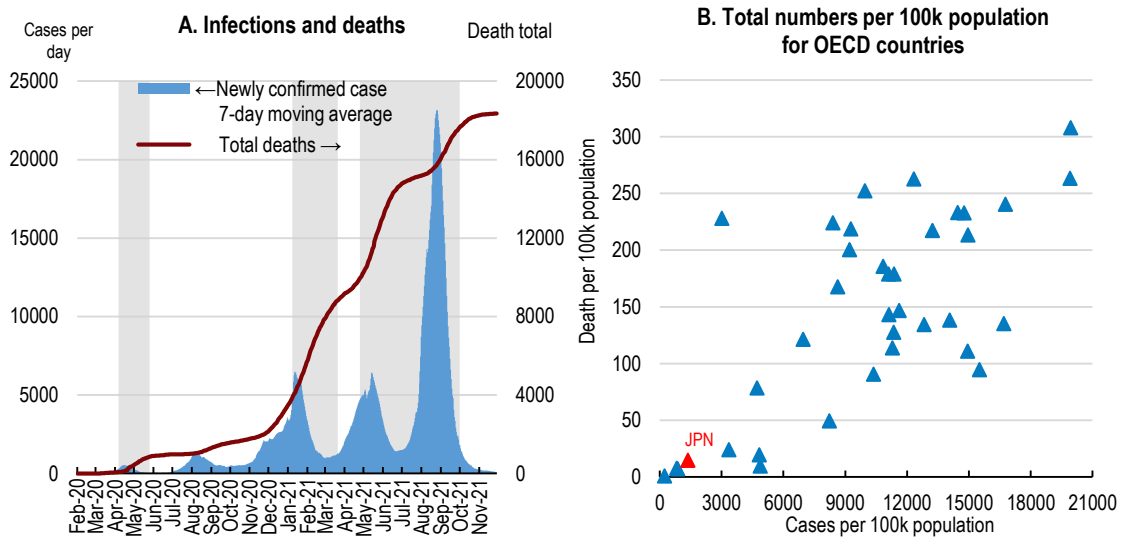
A second wave of infections between late-July and mid-August 2020 saw a limited rise in new cases of COVID-19 and a comparatively low death rate, thanks in part to test-track-and-trace measures. While limiting the number of infections considerably below the health system's capacity to cope with them, central and local governments gradually lifted the restrictions on large-scale events and other activities involving close personal interaction. Central government also subsidised travel and eating-out to assist the domestic tourism and hospitality sector. However, partly as a result of increased movement, the number of infections rose worryingly in late 2020, prompting the government to declare a second state of emergency in January 2021. Unlike the first one, it targeted designated areas, and still permitted small-scale events and school attendance. With the spread of new and more contagious variants in 2021, a third and then a fourth state of emergency were declared. In the meantime, an amendment to the law in February 2021 granted governors of prefectures affected by the state of emergency greater powers, enabling them to order restaurants and bars to shorten their hours and to compensate or fine them.

One key vulnerability in coping with the virus was limited medical capacity to deal with infections. While Japan has more hospital beds per capita than other G7 countries, it has fewer physicians, and the number of beds devoted to COVID-19 was relatively modest (Figure 1.3). Therefore, when infections rose in particular localities, hospital admissions could quickly stretch health service capacity. In addition, large-scale vaccination started later in Japan than in other G7 countries (Figure 1.4). The vaccination campaign was initially limited to a sole vaccine. There were initial teething problems in getting local government

online vaccine information systems operational. Subsequently, more vaccines were approved and more resources devoted to making vaccination available. As a result, the pace of vaccination picked up, with over 1 million doses administered daily by mid-June 2021 and Japan's national vaccination rate overtaking that of the United States in September, and that of all other G7 countries by November.

Figure 1.2. Infections and deaths are relatively low, but difficult to bring under control

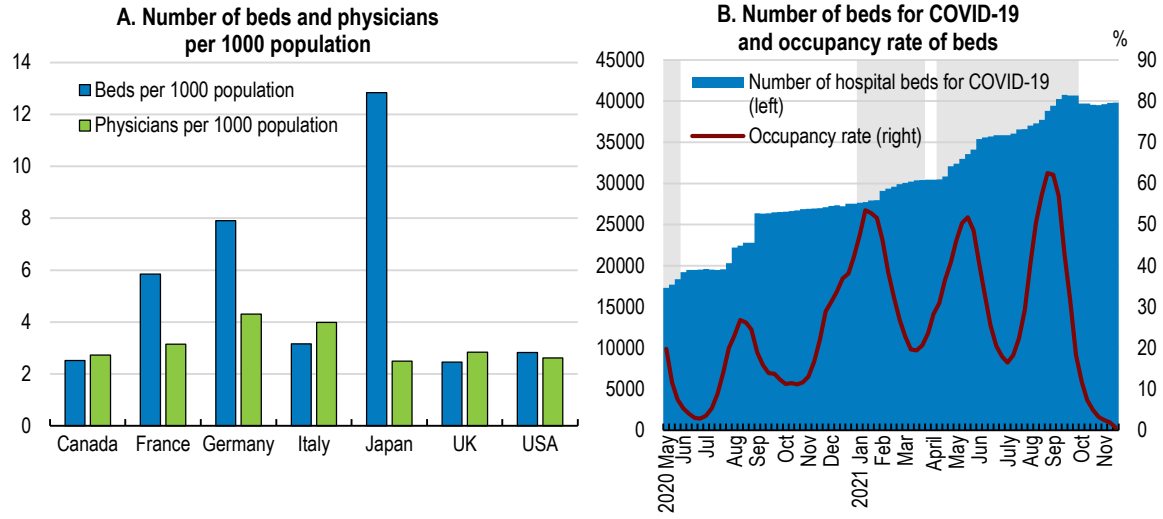
COVID-19 infection cases and deaths



Note: Shaded areas show when a state of emergency was in place in at least one prefecture. Data retrieved on the 29th of November 2021.
Source: Ministry of Health, Labour and Welfare, WHO COVID-19 global table data.

StatLink https://stat.link/tjv1g5

Figure 1.3. While beds appeared ample, the health service struggled with infections



Note: Number of physicians for 2018. Number of beds for 2019 except for the United States (2018). Shaded areas show when a state of emergency was in place in at least one prefecture.
Source: OECD Health Care Resources Database, and Ministry of Health Labour and Welfare.

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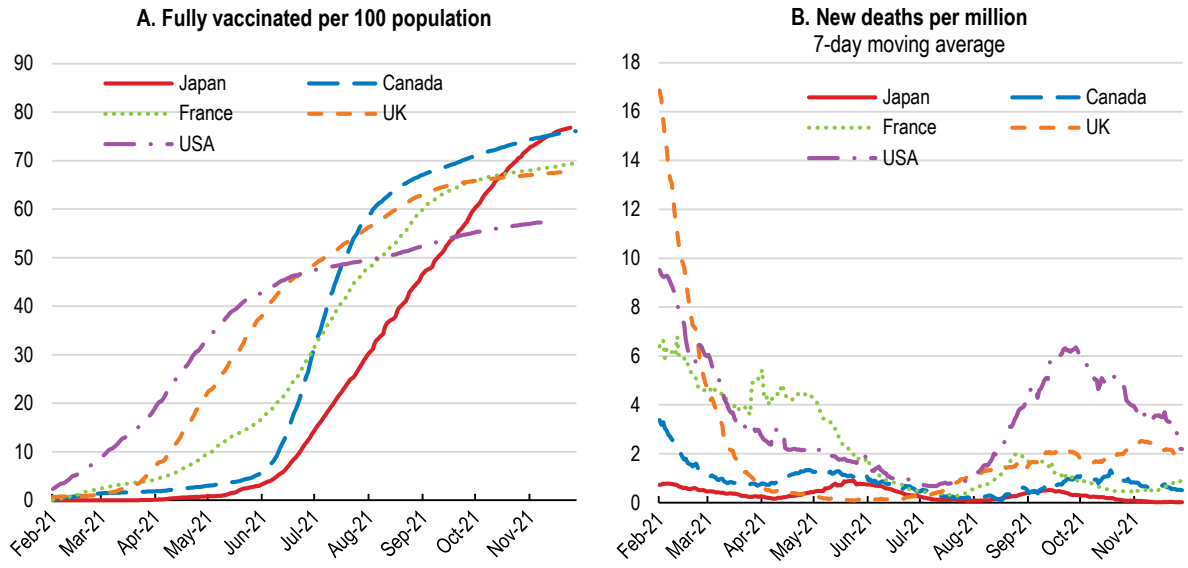
Figure 1.4. Vaccination started slowly in 2021, but has accelerated



Note: missing data is interpolated. Data retrieved on the 29th of November 2021.
Source: Our World in Data.

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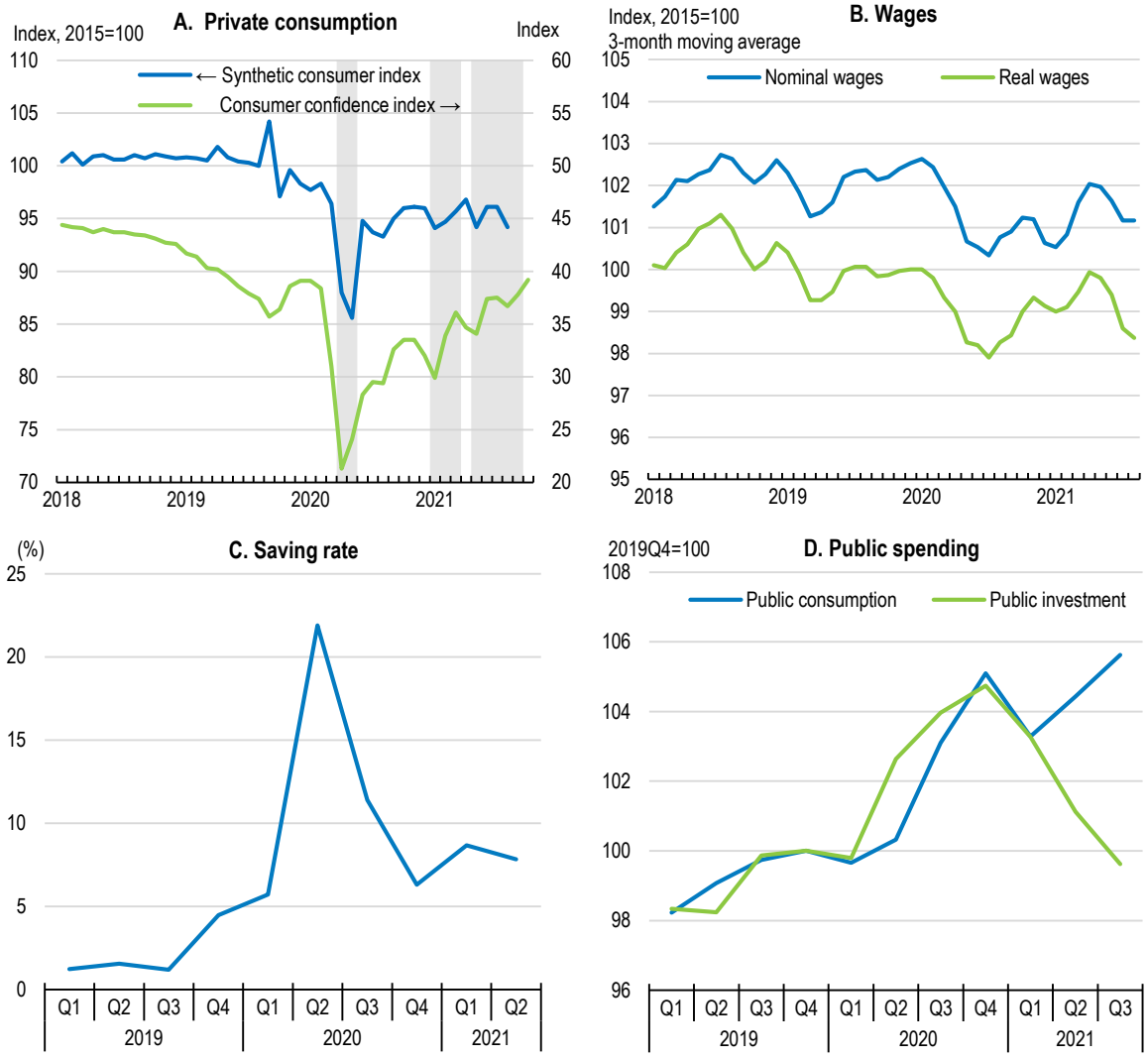
The economy rebounded from the initial shock, but growth remains subdued

With the onset of the pandemic and the introduction of the first state of emergency, consumer confidence and private consumption plunged (Figure 1.5). They bounced back to some extent as sanitary restrictions were eased and infection rates declined, supported by government incentives. However, subsequent waves of infections gave rise to stop-and-go confinement measures holding back private consumption and the recovery in consumer confidence has been less than complete. Even so, as sanitary measures have become more geographically targeted and households and businesses have adapted to the new environment, not least by employing digital tools, the impact of new sanitary measures on the economy has lessened.

The pandemic entailed immediate job losses. The number of people employed dropped by almost one million in April 2020 and has not recovered completely since (Figure 1.6). Most of the job losses were concentrated in industries particularly exposed to the coronavirus and confinement measures, such as accommodation, food and drink services and to a lesser extent manufacturing. Employment in healthcare by contrast rose over the past year. The initial job losses were felt more heavily by women. However, by April 2021, more women had (re) entered employment such that employment loss relative to the pre-pandemic level was standing around 200,000 whereas for men the loss exceeded 500,000.

The unemployment rate rose relatively gradually from 2.5% prior to the pandemic and peaked at 3.1% in October before starting to edge down, partly thanks to employment retention measures. The rise in unemployment was more pronounced for younger age cohorts. Those remaining in employment saw hours cut by 10% relative to pre-pandemic conditions at the nadir in May 2020. Wages also fell, although more modestly than the cut in hours, partly due to composition effects as after the initial shock the numbers (of women) in regular employment rose steadily whereas low-wage workers with non-regular contracts were more likely to lose their jobs. In addition, mid-year and end-of-year bonuses, which typically make up a sizeable portion of total compensation, were sharply retrenched. As a result, total household earned income fell in 2020, before gradually recovering as the economy began to reopen.

Figure 1.5. Private consumption has been subdued and public spending has expanded

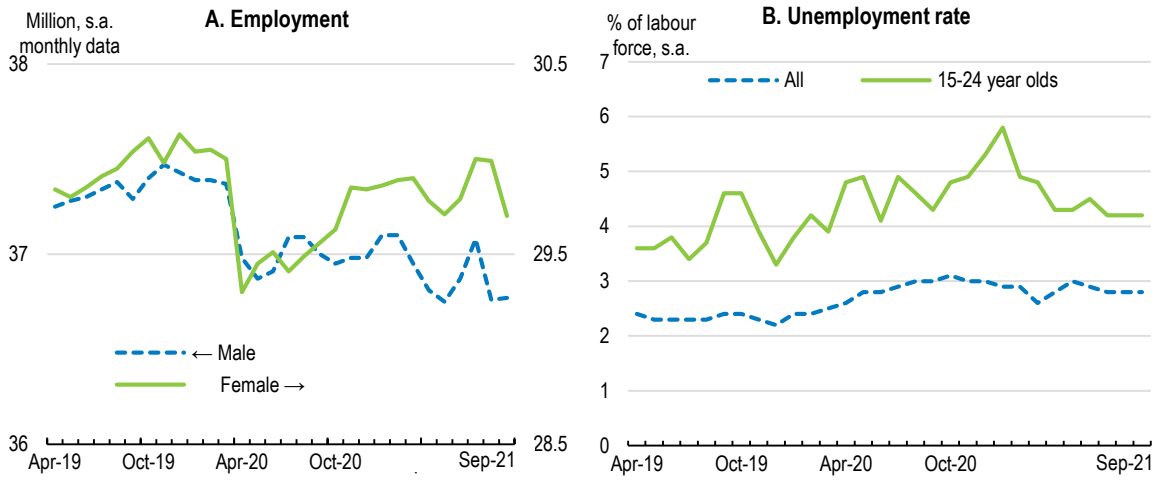


Note: Shaded areas show the term of state of emergency for at least one prefecture. Public spending are real numbers.
Source: Cabinet Office; and Ministry of Health, Labour and Welfare.

StatLink https://stat.link/dfgp4k

The initial economic recovery benefited from strong export markets, particularly in East Asia and the United States. The recovery in exports outpaced imports, reflecting weak private consumption growth (Figure 1.7). While the strong rebound of automobile-related demand in 2020 has moderated recently, exports of ICT-related products continue to strengthen as trading partners recover. The recovery of industrial production has boosted investment (as tracked by higher-frequency capital goods shipments), which had collapsed in mid-2020 along with industrial production (Figure 1.7). The recovery of trade has been uneven as supply bottlenecks have periodically constrained growth. For example, shortages of intermediate goods, once inventories were depleted, have held back automobile exports, which fell by almost 15% in August 2021. The recently signed Regional Comprehensive Economic Partnership (RCEP) Agreement will support stronger trading relationships and promote free and fair trade and investment amongst members, notably through tariff reductions, simplification of rules of origin, prohibition of performance requirements (such as technology transfer and adoption of a given royalty rate under a license contract), free data flow and better intellectual property rights protection.

Figure 1.6. Employment dropped rapidly while unemployment rose more gradually



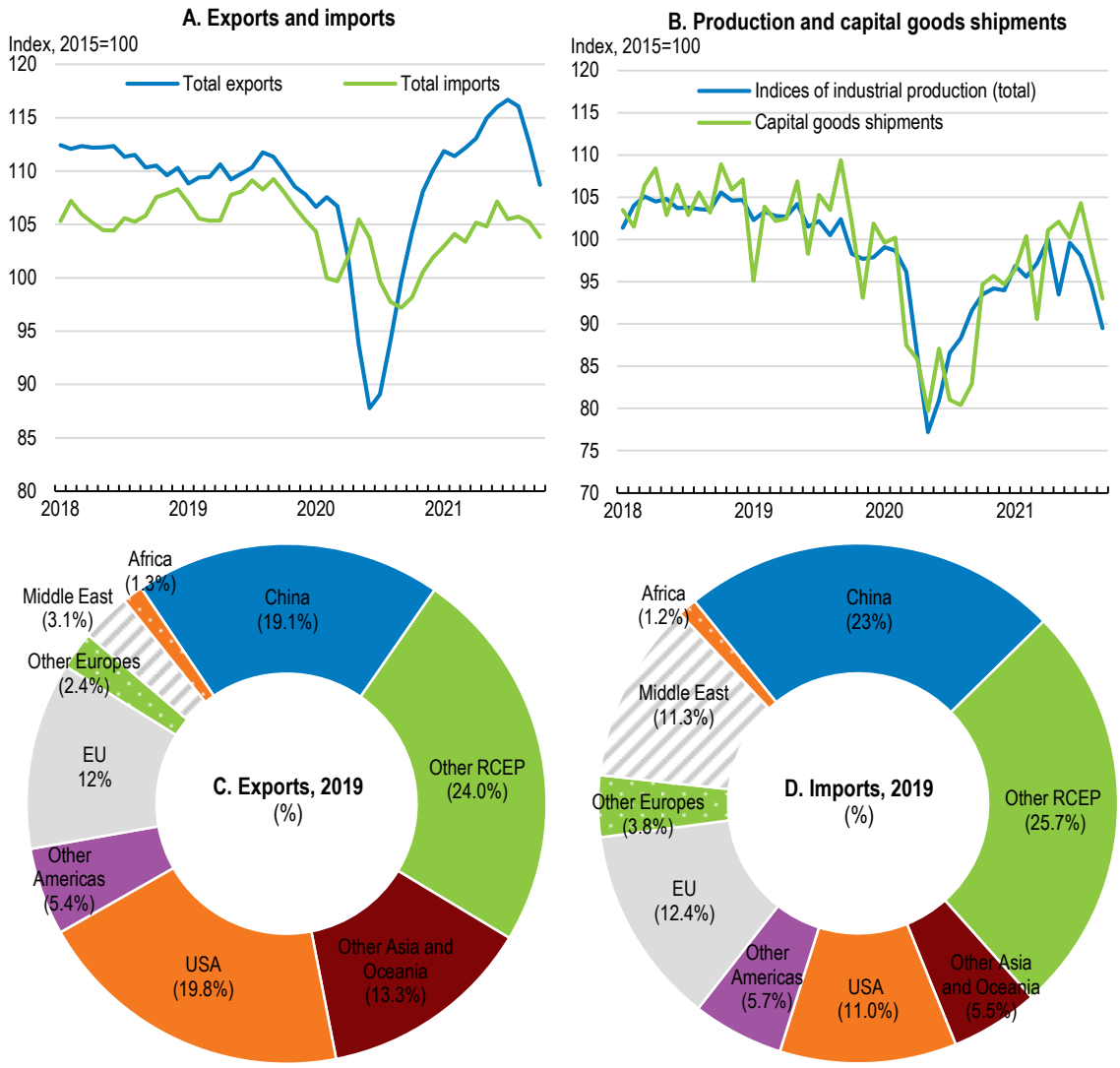
Note: Seasonally adjusted figures are calculated by removing seasonal components from the original series, using the U.S. Census method.
Source: Statistics Bureau of Japan, Labour Force Survey.

StatLink https://stat.link/advl0w

Inbound tourism had been a rapidly growing part of the economy in recent years, following relaxation of visa requirements and overseas promotion efforts. International visitor arrivals nearly quadrupled between 2010 and 2019 to almost 32 million, with much of the increase accounted for by visitors from China, South Korea and Hong Kong, China. Pandemic-related restrictions on international travel, which have tried to leave flows open with countries with limited infection rates, led to visitor numbers collapsing to just 4 million in 2020 and remaining subdued so far in 2021. The planned Olympics and Paralympic Games were postponed in 2020 and while the initial hope was for tourists to come for the games, eventually decisions were made to limit audience numbers and prevent international tourists from attending. As a result, the expected boost to economic activity from associated inbound tourism was considerably reduced. Some investments in infrastructure, tourism and hospitality in anticipation of the Games will nonetheless increase capacity when international travel again becomes feasible (Osada et al., 2016[1]).

Macroeconomic policy reacted strongly in the face of the pandemic. The Government launched a series of economic measures to keep workers attached and secure business continuity. They included the Employment Adjustment Subsidy, cash benefits to small and medium-sized enterprises (SMEs) and concessional loans. The coverage of the Employment Adjustment Subsidy was expanded and its eligibility criteria were relaxed. As a result, non-regular workers who are not covered by employment insurance, were covered. Furthermore, targeted support was provided for industries particularly hard hit by the pandemic. For example, the government provides subsidies to businesses that are requested to shut down for a period or reduce operating hours. These measures have successfully protected jobs and businesses. Indeed, compared with many other countries unemployment has remained low, bankruptcy numbers have fallen and the spread of infections has remained relatively muted. In addition, a special JPY 100,000 (around USD 900) cash payment was made to all individuals around mid-2020. This contributed to a sharp increase in the household saving rate in 2020, partly as a result of its untargeted nature and of measures to prevent the spread of infections. The spike in the aggregate saving rate largely reflected a fall in the consumption of higher-income households. Furthermore, the subsidies for travel, lodging and restaurants in a series of *Go to…* campaigns promoting domestic tourism and entertainment activities were implemented. However, these policies were suspended as infections began to climb again. Public consumption and investment were stepped up to address the pandemic and support the recovery. Monetary policy was also supportive and ensured ample liquidity for the financial sector.

Figure 1.7. External demand and capital goods shipments bounced back



Note: EU includes United Kingdom. Other RCEP includes Australia, Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, New Zealand, the Philippines, Singapore, South Korea, Thailand, and Vietnam.
Source: Bank of Japan, Ministry of Economy, Trade and Industry, Ministry of Finance, and OECD calculation.

StatLink https://stat.link/ech1bn

Following the sharp contraction in 2020, the economy is projected to recover, gradually eliminating slack (Table 1.1). The government in September 2021 announced a plan to relax restrictions as vaccination progresses, even in the case of a new wave of infections. As sanitary restrictions are lifted and vaccination accelerates, economic activity will strengthen. Subsidies to support the service sector (for travel costs), which were suspended in December 2020, are assumed to be restarted and boost consumption in 2022. However, the decision whether and when to restart this programme will be determined taking into account COVID-19 infection rates. While the household saving rate is projected to decline from the level reached in 2020, albeit without fully reverting to pre-pandemic levels, sluggish wages will limit the uptick in consumption growth. Exports are set to pick up thanks to the ongoing recovery of large trading partners, including the United States, China and other Asian countries. Relatedly, investment will gain speed, helped also by government subsidies promoting digitalisation and decarbonisation. Inflation is expected to rise only gradually from very low rates as domestic demand recovers, and cuts in mobile phone fees as well as the resumption of service sector subsidies push down the headline consumer price index.

While the outlook is for a steady expansion, there are substantial risks (Table 1.2). The evolution of infections is of major concern. Success in reducing transmission and progress in vaccination may allow a stronger recovery, whereas continued infections would hold back any recovery and potentially aggravate scarring with workers failing to regain employment and new entrants to the labour force not finding jobs. Commodity price spikes and supply-chain disruptions present threats, while progress in vaccination and additional fiscal packages in other countries could boost exports further.

Table 1.1. Macroeconomic indicators and projections

	2018	2019	2020	2021	2022	2023
	Current prices JPY trillion	Percentage changes, volume (2015 prices)				
GDP at market prices	556.2	0.0	- 4.6	1.8	3.4	1.1
Private consumption	305.0	- 0.3	- 5.8	1.3	4.2	1.7
Government consumption	108.9	1.9	2.8	2.7	1.1	- 1.7
Gross fixed capital formation	140.1	0.9	- 4.2	- 0.6	4.4	1.9
Final domestic demand	554.0	0.4	- 3.7	1.1	3.5	1.0
Stockbuilding[1]	2.0	0.0	- 0.1	- 0.2	0.1	0.0
Total domestic demand	556.1	0.5	- 3.8	1.0	3.6	1.0
Exports of goods and services	101.9	- 1.5	- 11.7	11.3	4.3	3.4
Imports of goods and services	101.8	1.0	- 7.3	6.0	4.9	2.6
Net exports[1]	0.1	- 0.4	- 0.7	0.8	- 0.1	0.1
Memorandum items						
GDP deflator	_	0.6	0.8	- 0.6	0.6	0.7
Consumer price index[2]	_	0.5	0.0	- 0.2	0.8	0.8
Core consumer price index[3]	_	0.4	0.1	- 0.5	0.5	0.8
Unemployment rate (% of labour force)	_	2.3	2.8	2.8	2.6	2.4
Household saving ratio, net (% of disposable income)	_	2.7	10.7	7.1	5.8	3.3
General government financial balance (% of GDP)	_	- 2.9	- 9.5	- 6.4	- 6.9	- 3.1
General government gross debt (% of GDP)	_	223.0	237.3	242.0	243.4	244.0
Current account balance (% of GDP)	_	3.4	2.9	3.2	2.5	2.5

1. Contributions to changes in real GDP, actual amount in the first column.
2. Calculated as the sum of the seasonally adjusted quarterly indices for each year.
3. Consumer price index excluding food and energy.
Source: OECD Economic Outlook 110 database.

Table 1.2. Events that could lead to major changes in the outlook

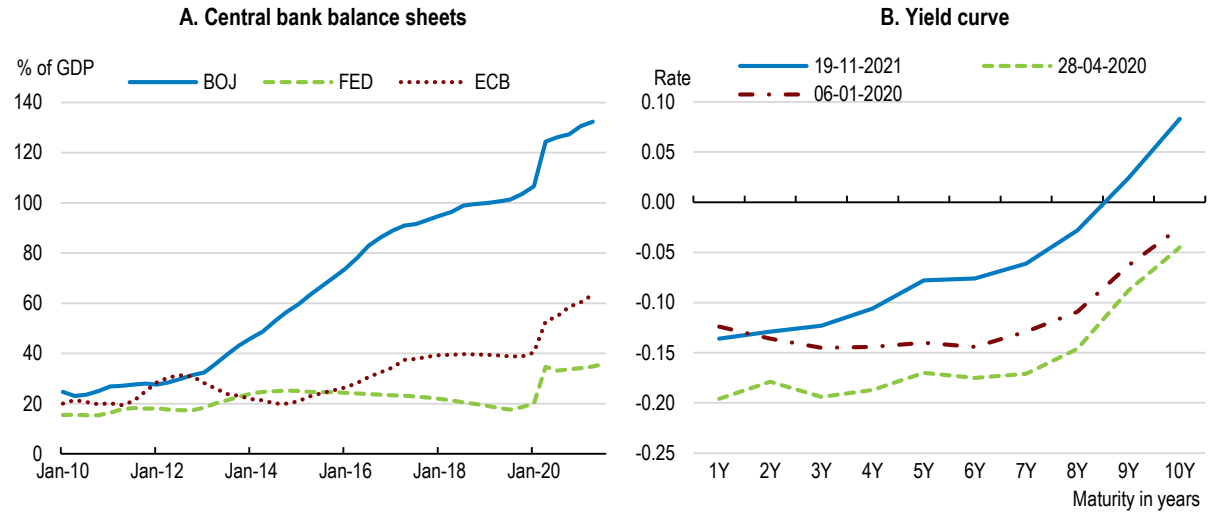
Shock	Likely impact	Policy response options
Further waves of infections and new states of emergency, for instance due to concerns about the spread of new variants of COVID-19.	New restrictions would likely be imposed leading to a further demand shock.	Continue to target support measures where restrictions are more necessary, roll out vaccination and provide resources to the health sector.
Climate policy changes in major export markets disrupt trade flows.	Trading partners may adopt policies that penalise exports from counties with greater reliance on fossil fuels.	Continue plans to cut emissions and increase energy efficiency to minimise the threat.
Natural disasters such as earthquakes, tsunamis and typhoons.	Significant loss of life and damage to the capital stock, requiring fiscal policy reaction.	Investment in disaster prevention and mitigation as well as preparing disaster management policies.
Cyberattacks affecting key services.	Disruption of key government services, the financial sector, infrastructure and major firms.	Develop operational resilience by drawing up contingency plans and regularly reviewing vulnerabilities.

Monetary and financial policies have been accommodative

Monetary policy reacted promptly to the pandemic

The Bank of Japan moved quickly in response to the pandemic and adjusted measures as understanding of the shock evolved (Table 1.3). Overall, monetary policy continues to be accommodative. The Bank of Japan has used quantitative and qualitative easing and yield curve control to maintain short-term policy interest rates at minus 0.1% and the 10-year government bond yield around zero, keeping the yield curve relatively flat (Figure 1.8). The renewed commitment to buying Japanese government bonds, the increased purchase of T-bills and the new funding-for-lending type measures to cope with surging loan demands amid Covid-19 have boosted the balance sheet further. The Bank of Japan now holds around 7% of the total market capitalisation of the first tier of the Tokyo Stock Exchange and just under half of the total stock of Japanese government bonds (Fueda-Samikawa and Miyazaki, 2021[2]).

Figure 1.8. The Bank of Japan boosted its balance sheet



Source: Statistics Bureau of Japan, Bank of Japan, Federal Reserve Board, Bureau of Economic Analysis, European Central Bank, Eurostat, Ministry of Finance.

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Inflation remains subdued

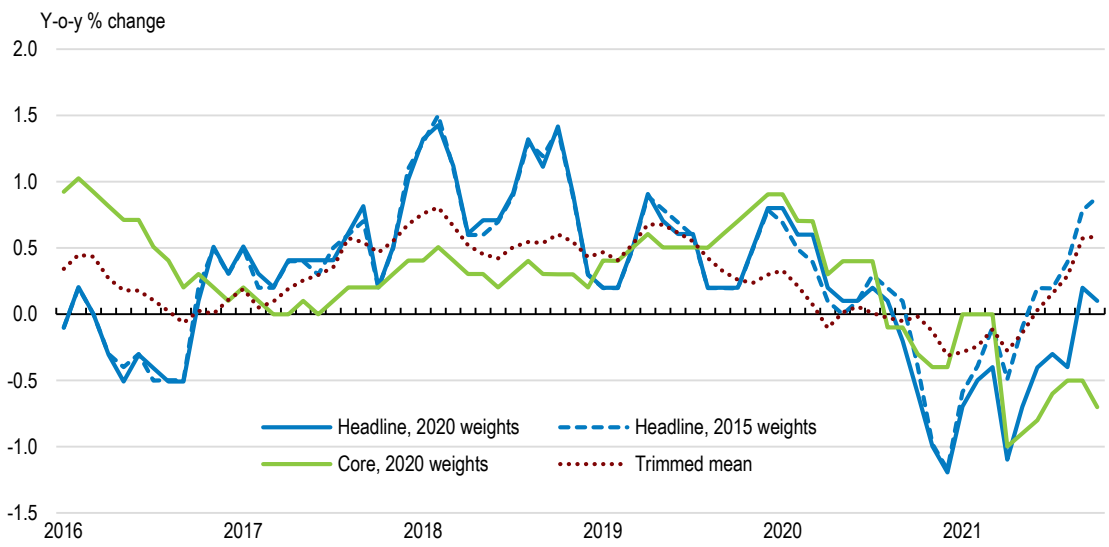
Consumer price inflation has been hovering around 0-1% in recent years, persistently undershooting the 2% Bank of Japan target rate (Figure 1.9). Wage inflation has slowed as well since late 2019. While the effect of the pandemic was deflationary during 2020 and early 2021, several policy-induced changes were also weighing on prices. For example, the reduction in mobile phone charges, at the behest of the government, had a sizeable impact on inflation rates (around 1.1 percentage points). In addition, government subsidies to the domestic travel and hospitality sector have put downward pressure on their prices. Stripping out these transitory effects, a trimmed mean measure of underlying inflation has begun to inch up more recently.

Inflation expectations have remained subdued, partly a result of a backward-looking component that is strong in relation to other OECD economies and has given limited traction to the inflation target following its introduction in 2013 (Turner et al., 2019[3]). However, inflation should gradually pick up as the economy begins to emerge from the pandemic and spare capacity shrinks. Inflation pressures may also come from the external sector. Increasing commodity prices, spikes in the costs of international transportation and

recent exchange rate depreciation have put upward pressure on import prices. However, the collapse of import prices when the pandemic hit was substantial, such that on a year-over-year basis import price inflation remained negative in early 2021. Nonetheless, sustained commodity price increases, further supply disruptions and rising inflation in other markets overseas could pass through to higher domestic inflation. Inflation expectations have not moved much in recent years but are likely to increase as observed inflation picks up along with economic conditions. Against this backdrop, it is appropriate that monetary policy accommodation is not withdrawn prematurely.

Figure 1.9. Inflation temporarily turned negative

Consumer price inflation



Note: The base year for the CPI has recently shifted from 2015 to 2020. The inflation series are not adjusted for the impact of the October 2019 consumption tax hike. The core CPI measure excludes fresh food and energy. The trimmed mean is calculated by excluding the top and bottom decile of the price changes (measured by items' weight in the CPI).
Source: Statistics Bureau, Bank of Japan.

StatLink https://stat.link/prt7i6

In March 2021, the Bank of Japan released the results of a policy assessment, which confirmed the usefulness of the existing 2% inflation target, Quantitative and Qualitative Easing with Yield Curve Control, negative interest rates and commitment to overshooting. With an eye to ensuring the sustainability of monetary easing and remaining nimble in the face of changing economic and financial circumstances, the assessment introduced a few changes. The first one was to establish the Interest Scheme to Promote Lending, in which interest is paid, as an incentive, and the rates are linked to the short-term policy rate on financial institutions' balances held at the Bank of Japan. With this scheme, the Bank of Japan can cut short- and long-term interest rates more nimbly while taking into account the impact on financial intermediation. The second change was a clarification of the fluctuation range for the yield on 10-year government bonds, aiming to find the appropriate balance between controlling yields and maintaining market functioning. This may eventually allow banks to earn some profits from a somewhat steeper yield curve. The third one was to relax the commitment to purchase exchange-traded funds, though maintaining the intention to re-enter the market when it is volatile. This change reflects an assessment that the effects of purchases tend to be greater the higher instability in the financial markets and the larger the size of purchases.

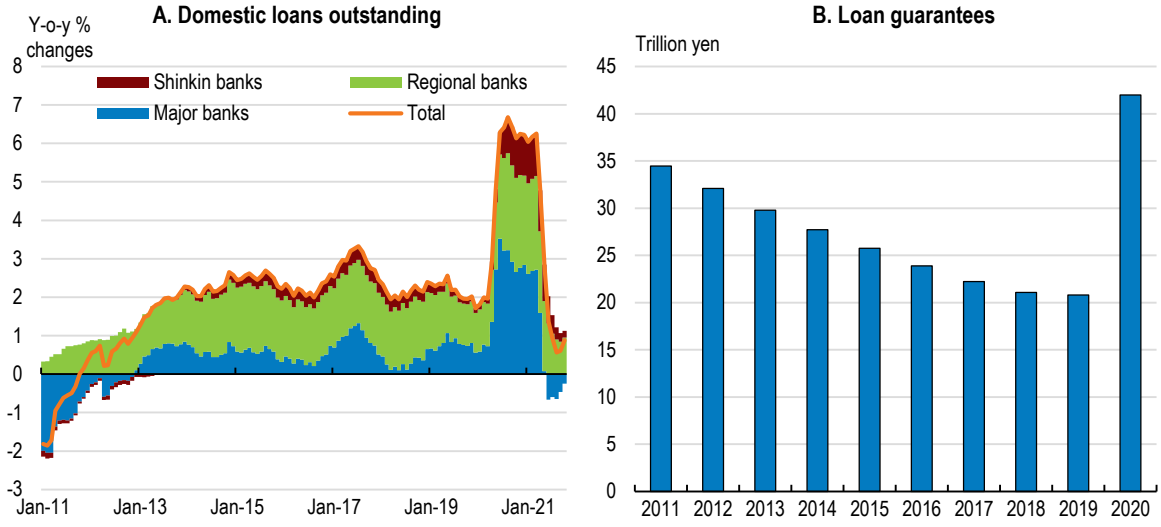
Table 1.3. Chronology of major monetary policy announcements since end 2019

Date		Measures or announcements
2020	**March**	The Bank of Japan enhances monetary easing through: • further ample supply of funds through purchases of Japanese government bonds (JGBs) and U.S. dollar funds-supplying operations. • measures to facilitate corporate financing until the end of September 2020 by: introducing the Special Funds-Supplying Operations to Facilitate Corporate Financing regarding the Novel Coronavirus (COVID-19), providing loans against private debt as collateral at a 0% interest rate, and increasing the upper limit of purchases of commercial paper and corporate bonds (additional purchase: JPY 2 trillion in total). • active purchases of ETFs and Japan real estate investment trusts (J-REITs) raising the annual limit to about JPY 12 trillion and about JPY 180 billion respectively.
	April	The annual JPY 80 trillion ceiling on JGB purchases is repealed and the upper limit of the amount outstanding of commercial paper and corporate bond purchases is raised to JPY 20 trillion. The collateral requirement for the special operation to provide 0% interest loans is eased and a 0.1% interest rate is applied to the outstanding loans provided through this operation, so as to provide loans up to JPY 23 trillion.
	May	The Bank of Japan introduces a new fund-provisioning measure (fund-provisioning against eligible loans such as interest-free and unsecured loans made by eligible counterparties based on the government's emergency economic measures: about JPY 30 trillion). This new measure is integrated into the Special Funds-Supplying Operations to Facilitate Corporate Financing regarding the Novel Coronavirus (COVID-19). The term of this measure and additional purchases of corporate bonds and commercial paper is extended until March 2021
	December	The term of the additional purchases of corporate bonds and commercial paper and the Special Funds-Supplying Operations to Facilitate Corporate Financing for COVID-19 is extended until September 2021, and the upper limit of lending to each financial institution in this scheme is removed.
2021	**March**	The Bank of Japan introduces an “Interest Scheme to Promote Lending”, providing interest payment linked to the short-term policy interest to the outstanding lending through fund-provisioning measures. In addition, the Bank of Japan clarifies that the 10-year JGB yield is to fluctuate between around plus and minus 0.25% from the target, and introduces "fixed-rate purchase operations for consecutive days" to set an upper limit on the interest rate. Furthermore, the Bank of Japan modifies the guidelines for ETF and J-REIT purchases.
	June	The term of the additional purchases of corporate bonds and commercial paper and the Special Funds-Supplying Operations to Facilitate Corporate Financing for COVID-19 is extended until March 2022. The Bank of Japan announces its intention to introduce a new fund-provisioning measure for investment or loans by financial institutions to address climate change issues.
	September	The Bank of Japan announces the details of the Funds-Supplying Operations to Support Financing for Climate Change Responses (Climate Response Financing Operations).

The financial sector has supported firms during the pandemic

Financial institutions provided credit as cash flows dried up with the onset of the pandemic (Figure 1.10). The build-up of loans was split between large and small enterprises and concentrated in the manufacturing sector. Major banks tend to lend to larger enterprises, whereas regional banks lend to small and medium-sized enterprises. Part of the pickup in SME lending was underpinned by the public credit guarantee corporations, which support lending to small and medium-sized enterprises. As a consequence, loan guarantees have risen substantially, to over 7% of GDP – exceptionally high by international standards. By mid-2021, the growth of loans had slowed to rates seen through most of the 2010s. In the household sector, housing loans remained relatively unaffected by the pandemic. In contrast, outstanding credit card loans declined as the pandemic and confinement measures led to a curtailment of private consumption.

Figure 1.10. Lending surged as cash flow dried up, backed by loan guarantees



Note: Shinkin banks are local credit unions. In panel B, horizontal axis shows fiscal years.
Source: Bank of Japan, Principal Figures of Financial Institutions; Japan Federation of Credit Guarantee Corporations.

StatLink https://stat.link/qls6xe

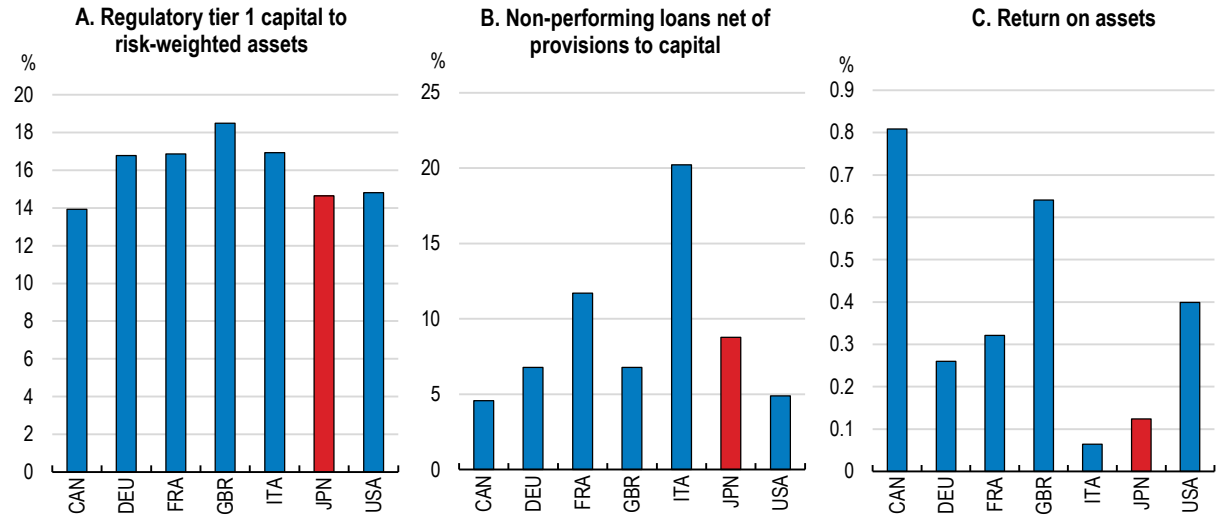
The financial sector has withstood the pandemic shock relatively well. Efforts to strengthen the financial sector, particularly the major banks, following the global financial crisis in 2008, appear to have paid off and recent stress tests suggest that the financial system is in a position to withstand further shocks while the economy continues to recover (Bank of Japan, 2021[4]). Capital adequacy of the major financial institutions appears in line with other major economies and non-performing loans is also relatively low (Figure 1.11). However, the return on assets is on the low side. Generally these metrics are weaker for the regional banks.

Financial policy needs to navigate the withdrawal of support and faces a number of risks. Notably, the cost of credit could increase, hitting some firms with high debt loads that are still struggling. One estimate suggests that up to 500,000 smaller companies, mainly in the sectors most exposed to the coronavirus, would face difficulties if restrictions on economic activity were to persist for more than two years (NRI, 2020[5]). A second set of risks revolves around elevated asset prices. Indeed, following the initial shock of the pandemic, some asset prices have climbed higher, notably stock prices (Figure 1.12). Housing prices have also strengthened, but less than elsewhere. Finally, some financial firms are exposed to foreign currency funding. Bank foreign-currency denominated loans have risen in recent years with regional banks increasing such loans to residents, whereas overseas branches of major banks have tended to increase these loans. In early 2020, a tightening of foreign currency funding markets required central banks around the world, including the Bank of Japan, to ensure sufficient liquidity. Japanese banks are increasingly focusing on how to balance the stability of foreign currency funding with their cost control. In this context, financial supervisors need to remain vigilant to liquidity and funding risks.

A number of other structural issues are emerging in the financial sector. Despite the relatively good measures of capital adequacy, chronic pressure on profits from ageing and the low-interest rate environment raises some questions about the banking sector. As highlighted in the previous *OECD Economic Survey*, given the incentives some financial institutions have to take on additional risk, financial regulators need to remain vigilant (OECD, 2019[6]). These incentives appear to be stronger in the regional banks, which are possibly also more vulnerable to emerging competition from FinTech.

Figure 1.11. The banking sector appears relatively sound

2021 Q1 or latest available data



Source: IMF Financial Soundness Indicators.

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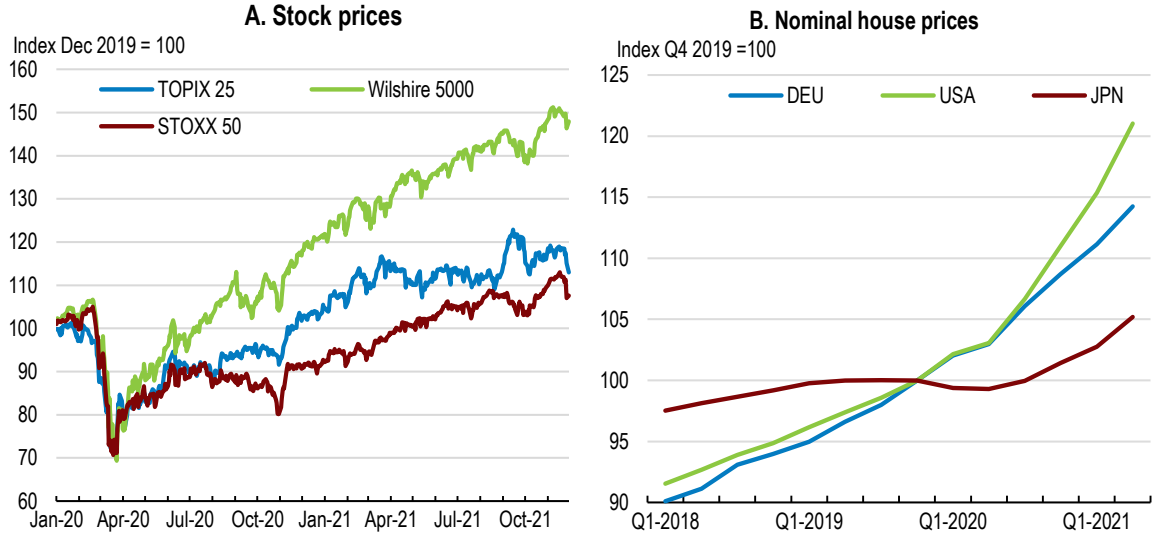
Figure 1.12. Some asset prices have surged



Source: Refinitiv; OECD Analytical house prices indicators.

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Addressing the relative weakness of regional banks

The regional banks (and the local credit unions or *Shinkin*) traditionally play an important role in lending to small and medium-sized enterprises, notably in rural areas. However, as the population and economic activity has increasingly been concentrated in larger metropolitan areas, the combination of low interest rates and an ageing population have created problems (high fixed costs in maintaining regional networks and fear of risk taking) and concerns about the health of the regional banking sector. Intensified competition in retail banking has seen an increasing concentration of loans to low-return borrowers (firms for whom

interest rates are low given their credit score) (Kawamoto et al., 2020[7]), with the share thereof amongst SMEs having risen to around one quarter before the pandemic (Bank of Japan, 2020[8]). This exposes regional banks to credit risks, particularly as the exceptional pandemic-related support for firms is withdrawn. The operational efficiency of the regional banks has been eroding since the mid-2000s. Digitalisation could play some role in reducing costs as cashless transactions and remote banking could reduce some of the fixed costs of maintaining a network of banks and ATMs. However, a recent survey of regional banks showed that while many felt operational efficiency had increased during the pandemic, only around one fifth were considering using information technology to reduce system costs (Fueda-Samikawa and Miyazaki, 2021[2]). Many saw ICT creating opportunities to expand customer services and improve the efficiency of face-to-face sales, but with progress constrained by ICT weakness in business partners.

As ageing is pronounced outside the major cities, progress in digitalisation needs to be balanced against the danger that technology-shy elderly and other customers may lose access to some financial services if banks retrench physical provision drastically. Against this backdrop, the Bank of Japan introduced a special deposit facility and the FSA established a scheme to encourage regional financial institutions to strengthen their efficiency and business foundations (with knock-on benefits for the regional economy). Many regional banks are considering ways to rely more on providing fee-based services (almost 70% in the aforementioned survey), which may be needed given that digitalisation entails new sources of competition in banking services.

Digitalisation of financial services

The ongoing digitalisation of the financial sector and the development of FinTech create new opportunities and challenges for policy (Box 1.1). One issue is mitigating cyberattacks, which have become more prevalent particularly as computing and remote working become more common (Bank of Japan, 2021[4]). In addition, regulatory and competition issues arise as new technologies can facilitate the provision of financial services by non-bank entities. For example, intensified competition could push down bank profitability further and aggravate search-for-yield incentives. As such, the authorities will need to keep abreast of such developments to understand where risks are being built up and whether evading regulatory requirements constitutes unfair competition.

Box 1.1. The promise and challenges of FinTech

Japan has been at the forefront of some FinTech developments, particularly with respect to cryptocurrencies. The involvement of the banking sector has been more muted, partly due to regulatory issues. Cybersecurity and the interaction with the rest of the financial sector are issues of concern in a rapidly evolving market.

The Japanese authorities were quick in responding to crypto currencies. The Payment Services Act recognised these currencies as legal property, requiring traders to register in order to comply with anti-money laundering and combating the financing of terrorism regulations. Partly due to establishing a favourable regulatory environment, Japan has become a major market for Bitcoin with 29 bitcoin exchanges in operation. The tax authorities tax gains on these currencies. In 2020, legislation came into effect to regulate cryptocurrency derivative trading that fell outside the Payment Services Act. After a series of cyberattacks, the Financial Services Agency has begun to regulate the exchanges more rigorously. This has also led to greater self-regulation by the participants on these exchanges.

The Bank of Japan has been evaluating the possibility of a central bank digital currency. Work initiated in 2016 with the European Central Bank explored distributed ledger technologies (European Central Bank; Bank of Japan, 2020[9]). In April 2021, the Bank of Japan began testing basic functions such as issuance, distribution, and redemption, focusing on a general purpose (or retail) central bank digital

currency. It envisages future work on ensuring privacy, handling end-user information and the impact on financial intermediation of banks.

At present, banking regulation limits banks' ability to engage in non-banking activities. As such, banks are forming partnerships with technology companies. Indeed, three of the major banks have announced a collaboration with technology companies. An alternative approach is to exploit firm databases to understand when contractors and subcontractors may need additional funding during a major project.

Another strand of development has been so-called platformers. They initially offered digital payments services, but with a large customer base have developed new financial services. Likewise, retail companies are trying to leverage the information from their customer databases in offering new services. By linking data from different databases, new approaches to screening loan applications are possible. For example, "smart money lending" can assign a credit rating score based on an individual's behaviour, both financial and non-financial. In this way, credit can become available to previously unbanked individuals and in some cases small firms (Bank of Japan, 2021[10]).

As the experience of the cryptocurrencies exchanges shows, regulation needs to be nimble to ensure cybersecurity. Regulators also need to check whether technology companies and platformers' innovative uses of personal data are secure and do not expose clients to digital crime. In this regard, there are trade-offs in using third-party service providers for data services. Such firms can invest more heavily in cybersecurity, but regulators also need to assess whether their use is compliant with financial sector regulation (FSB, 2019[11]). Intensified competition with existing banks in an environment of low interest rates may also provoke heightened risk taking, particularly in the absence of a level-playing field (Restoy, 2021[12]).

Green finance is becoming more prominent

The green bond market in Japan grew quite rapidly in 2020, with issuance rising to over USD 10 billion, taking cumulative issuance to USD 68.4 billion (Climate Bonds Initiative, 2021[13]). Government-backed bodies, such as the Japan Housing Finance Agency, account for around one third of total issuance with buildings, transport and energy the most important market segments. The institutional framework around the market is also developing. A sizeable share of issues are reviewed, receive a green bond rating and some are certified, thereby reducing the risk of "greenwashing". Furthermore, there is growing support for environmental, social and governance (ESG) reporting. For example, a public-private partnership, the Taskforce on Climate-related Financial Disclosures (TCFD) Consortium, was launched in 2019 to promote improved climate-related financial disclosures, including through issuing guidelines (TCFD Consortium, 2020[14]). In addition, the Tokyo Stock Exchange revised its Corporate Governance Code in June 2021, requiring future listed companies on the Prime Market to disclose information based on TCFD recommendations or equivalent international frameworks (Tokyo Stock Exchange, 2021[15]). Furthermore, the Financial Services Agency established a working group under the Financial System Council to discuss the disclosure system, including sustainability, with a broad range of stakeholders. Other governments and central banks have also become involved in this area. For example, the European Union's Sustainable Finance Disclosure Regulation of March 2021 requires financial firms to be transparent to their clients about sustainability risks and possible adverse sustainability impacts. In the United States, the Securities and Exchange Commission in March 2021 announced the creation of a Climate and ESG Task Force. Similarly, the Financial Services Agency has established a Sustainable Finance Office. The Network of Central Banks and Supervisors for Greening the Financial System, of which the Bank of Japan and the Financial Services Agency became members, have supported such initiatives. The Financial Services Agency will continue to work to avoid greenwashing such as by promoting discussion on issues of ESG rating and better data provision (Expert Panel on Sustainable Finance, 2021[16]). The Bank of Japan also announced the details of a new fund-provisioning measure in September 2021. This new facility provides funds for counterparties that have taken the decision to invest or lend, while discipline will be maintained through disclosure requirements on the financial institution's efforts to address climate change. The funds

will be provided until the end of fiscal year 2030, in principle, to give long-term support for financial institutions' efforts. The new facility will become operational by the end of 2021. Progress on these different initiatives could create the conditions for Japan to become an important node in green finance (Shirai, 2021[17]).

Table 1.4. Past OECD recommendations on monetary policy and the financial sector

Past recommendations	Actions taken
Monetary easing should be maintained as planned until inflation is durably above the 2% target, while closely monitoring costs and risks.	Monetary policy has remained accommodative.
Financial supervisors should encourage financial institutions to improve their risk management in areas where they have increased their risk-taking.	While not directed at risk management, policies have aimed to strengthen regional financial institutions. For example, the Financial Services Agency introduced a grant scheme in 2021 for regional banks to strengthen their business foundations through measures such as improving their business efficiency. The Bank of Japan introduced a special deposit facility to induce regional banks to strengthen their business foundation by paying interest on their excess reserve balance.

Fiscal policy reacted robustly

The government reacted swiftly to provide fiscal support in the face of the pandemic. It introduced economic policy packages in April and December 2020 and three supplementary budgets for fiscal year 2020 as the impact of the shock became clearer. Furthermore, it adopted an additional economic policy package in November 2021 (Table 1.5). The later measures focused more on the exit from the pandemic and beyond. This included support to enhance R&D and investment in advanced technologies, thus promoting the digital transformation and green growth. The support also strengthened policies to address distributional concerns and enhance workforce skills (Box 1.2). These initiatives will help sustain domestic demand while the economy remains weak. Indeed, support for structural reforms, which require upfront investments in education and training or physical capital, can help sustain demand in the short run while the economy is weak and improve longer-term economic prospects. The immediate fiscal measures have been successful in limiting drops in employment and enterprise failures, which are low by international comparison.

Box 1.2. Structural priorities in the New Economic Policy Package

On 19 November 2021, the government adopted a new economic policy package, with four pillars and highlighting growth and distribution. The total package amounted to JPY 78.9 trillion (around 14.6% of annual GDP) for fiscal years 2021-22, including estimated contributions from the private sector. Central and local governments are projected to spend JPY 49.7 trillion (9.2% of GDP), with the central government responsible for the lion's share (JPY 43.7 trillion).

The **first pillar** seeks to prevent the spread of COVID-19, with measures such as ensuring medical care provision, vaccines and drugs for COVID-19. It also provides support to vulnerable households and businesses, such as cash benefits for low-income households and affected small and medium-sized enterprises, and support for some sectors affected by high energy prices.

The **second pillar** is to support the reopening of socio-economic activities while preparing for the next crisis. This pillar includes measures such as using vaccination certificates or negative test results, restarting subsidies to stimulate demand in some service sectors, developing domestic vaccines and medicines and promoting international co-operation to reduce COVID-19 infections. A contingency reserve fund for COVID-19 (around JPY 6.8 trillion) is also included to be available for a future crisis.

The **third pillar** has two parts, a growth strategy and a distribution strategy:

1. The growth strategy includes expanding investment and R&D, especially for starting the operation of the University Endowment Fund worth JPY 10 trillion in FY2021, achieving the government's net zero carbon emission goal with clean energy technologies, a new initiative called "Rural-Urban Digital Integration and Transformation" for revitalising localities with digital technology, and "economic security" with a new fund to support key technologies and improve their supply.
2. The distribution strategy includes measures to promote wage increases, to promote human capital development and labour reallocation by combining vocational training and out-placement support, and to raise the salaries of workers in the public sector such as nurses or caregivers. It also encompasses support for families with children, such as cash benefits for child-rearing households and additional provision of child-care facilities.

The **fourth pillar** includes measures to enhance resilience and disaster management capabilities, for which the government established a five-year plan (FY2021-25).

Like in many countries, the policy packages entail sizeable fiscal costs (Figure 1.13). The general government deficit ballooned to around 10% of GDP in 2020 and is on course to exceed 6½ per cent of GDP in 2021. However, reflecting the transitory nature of the shock, subsequent policy support is expected to be pared back as progress with vaccination allows the economy to reopen more fully. Nonetheless, public debt as a share of GDP has risen to unprecedented levels by historical and comparative standards, with gross government financial liabilities now exceeding 240% of GDP. The net debt position is projected to remain high and liquidating government financial assets in a time of market stress may be difficult.

The deterioration in the fiscal position comes after a period of progress in reducing deficits and the ambition since around the turn of the century has been to move to a primary balance or surplus to help ensure long-run fiscal sustainability. Plans to achieve a positive primary balance have been repeatedly deferred (OECD, 2019[6]). Fiscal policy should continue to support the economy in the near term. Only once the recovery is secure should fiscal consolidation efforts resume in order to ensure long-run sustainability. The government has decided to continue its gradual efforts to achieve the fiscal consolidation target of reaching a primary surplus by FY-2025, and the economic and fiscal consequences of the COVID-19 shock will be reviewed during FY-2021 (Cabinet Office, 2021[18]). Based on recent Cabinet Office projections, assuming a high growth rate, the primary surplus would be achieved in FY 2027 without further expenditure reforms, and in FY 2025 if expenditure reform continues.

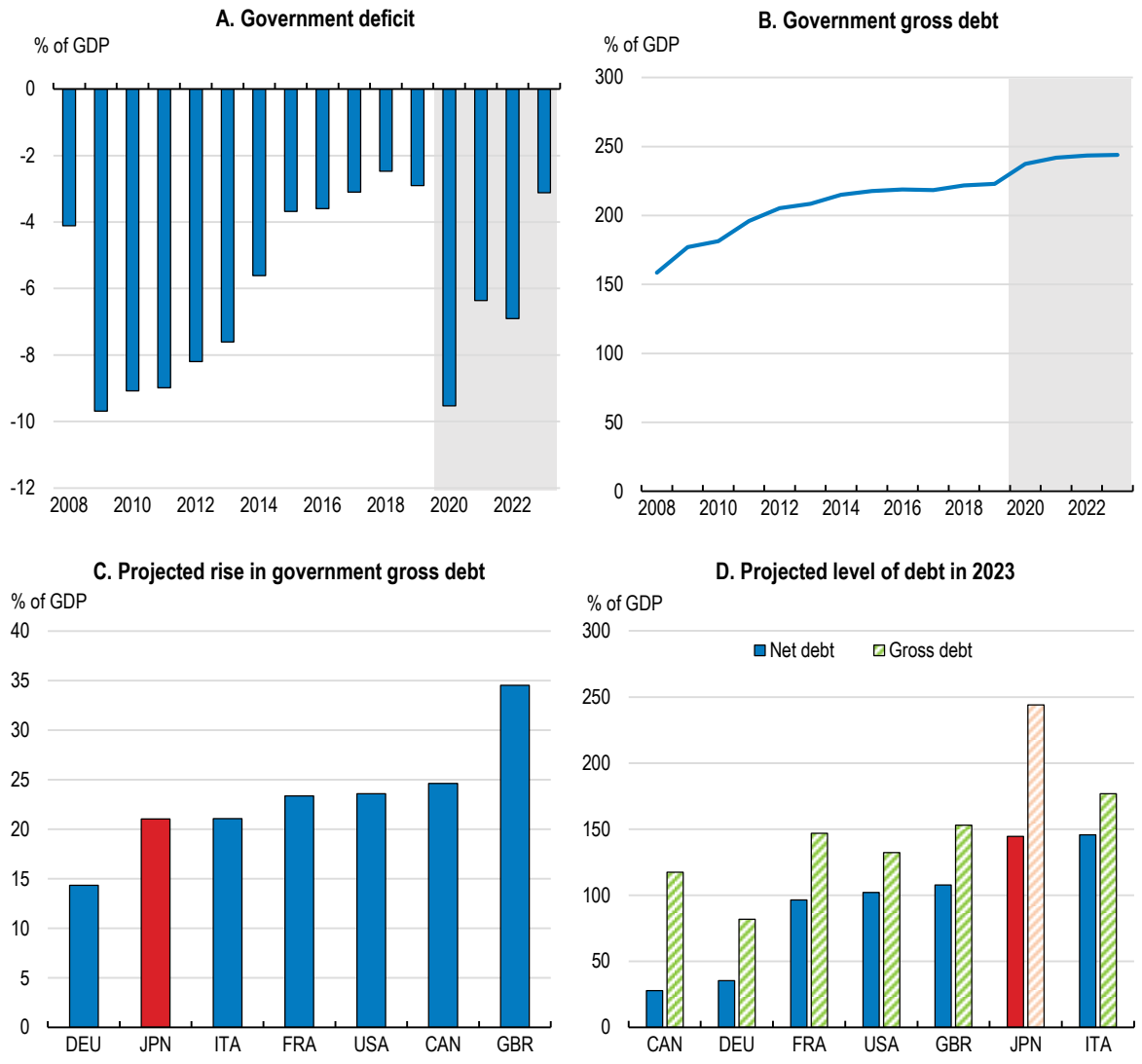
Recent evaluations of fiscal sustainability increasingly discuss the interest rate burden rather than the debt level, arguing that higher debt levels are sustainable in a low interest-rate environment (Blanchard, 2019[19]). Net interest payments on outstanding debt in Japan have fallen to under 1% of GDP in recent years, notwithstanding rising debt. However, the current very low interest rate burden partly stems from the Bank of Japan's Quantitative and Qualitative Easing and Yield Curve Control (Jones and Seitani, 2019[20]). This downward pressure on interest rates coupled with a large share of domestic financing has allowed the government to continue running budget deficits without risk of rising or volatile interest rates. As long as these conditions continue to hold, the financing of current debt levels is manageable. However, in the longer run, monetary policy success would imply higher interest rates as inflation remains durably around target and inflation expectations are consistent with a higher rate of inflation. Rising interest rates in the rest of the world may also break the current relationship. In this context, progress in fiscal consolidation will be needed to guard against a rise in interest rates pushing up interest payments and eventually initiating a debt spiral, even without additional pressures on the government budget.

Table 1.5. Fiscal policy support during the pandemic

Date of announcement	Measure
2020 10 March	The government uses a FY2019 budget contingency reserve fund to support the medical system, to lend to affected SMEs or individuals, etc. (JPY 0.3 trillion, i.e. 0.05% of 2019 GDP).
20 April	The government proposes a first FY2020 supplementary budget of JPY 25.7 trillion (5.0% of 2019 GDP) (legislated on 30 April), which includes: • Enhancing sanitary measures and medical care system including a JPY 1 trillion Local Revitalisation Grant for COVID-19 • Capital injection to Japan Finance Corporation for lending to SMEs: JPY 3.8 trillion • Cash benefit to affected SMEs: JPY 2.3 trillion • Cash benefit of JPY 100,000 for all people: JPY 12.9 trillion, for child-rearing household: JPY 0.2 trillion • "Go To campaign", subsidies for tourism and eating-out, etc. : JPY 1.7 trillion • Subsidy for supply-chain resilience, dissemination of PCs to pupils (GIGA School Initiative), etc.: JPY 0.9 trillion • New contingency reserve fund for COVID-19: JPY 1.5 trillion
19 and 26 May	Use of contingency reserve fund (twice): JPY 0.2 trillion in total, for supporting students and the medical system
27 May	The government proposes a second FY2020 supplementary budget of JPY 31.9 trillion (6.0% of 2019 GDP) (legislated on 12 June), which includes: • Extension of the "Employment Adjustment Subsidy" (subsidy for leave allowance) while raising the associated upper limit, and launching new benefits that furloughed employees can apply for: JPY 0.5 trillion (in addition, JPY 0.9 trillion is budgeted in the Special Account for Employment Insurance) • Launching a new grant to support rent payments of small businesses in distress (up to JPY 6 million): JPY 2.0 trillion • Strengthening financial support: concessional (interest free) loans, provision of subordinated loans: JPY 11.6 trillion • Reinforcing the medical care system: JPY 3.0 trillion • Increasing the Local Revitalisation Grant for COVID-19 by JPY 2.0 trillion • Increasing the contingency reserve fund for COVID-19 by JPY 10.0 trillion
7 August – 25 December	Use of contingency reserve fund (6 times): JPY 4.9 trillion in total, for enhancing medical care system, cash benefit to affected SMEs, Local Revitalisation Grant for COVID-19, benefit for single-parent households, etc.
15 December	The government proposes a third FY2020 supplementary budget of JPY 19.2 trillion (3.5% of 2019 GDP) (legislated on 28 January 2021), which includes: (1) Containment measures for COVID-19: JPY 4.4 trillion, including • Securing the medical treatment system and supporting medical institutions: JPY 1.6 trillion • Enhancing the testing system and developing the vaccine distribution system: JPY 0.8 trillion • Increasing the Local Revitalisation Grant for COVID-19: JPY 1.5 trillion (2) Promoting structural change and positive economic cycles for the post-corona era: JPY 11.7 trillion , including • Support for digital infrastructure reform of local organizations: JPY 0.2 trillion • Establishing a fund for R&Ds toward carbon neutrality: JPY 2.0 trillion • Establishing a Subsidy for Restructuring Businesses: JPY 1.1 trillion • Establishing the University Endowment Fund: JPY 0.5 trillion • Enhancing financial support for SMEs: JPY 3.2 trillion • Increasing the envelope for the "Go To Campaign": JPY 1.1 trillion (3) Securing safety and relief with respect to disaster management: JPY 3.1 trillion
21 December	The government tables the FY2021 initial budget proposal, which includes a JPY 5 trillion contingency reserve fund for COVID-19 (legislated on 26 March 2021).
2021 15 January – 27 August	Use of contingency reserve fund (three times in FY2020 and three times in FY2021): JPY 6.5 trillion in total, for securing vaccines, cash benefit to affected SMEs, the Local Revitalisation Grant for COVID-19, a benefit for child-rearing households, etc.
19 November	The government adopts a new economic policy package for "overcoming coronavirus infections and opening up a new era", with JPY 43.7 trillion of central government spending in FY2021 and FY2022.

Figure 1.13. Large-scale fiscal support has been provided

General government deficits and debt



Note: In panel C, projected rise in government gross debt refers to periods 2019 and 2023. In panel D, gross debt and net debt are government gross financial liabilities and government net financial liabilities, respectively.
Source: OECD Economic Outlook 110 database.

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Securing fiscal sustainability

Even if the short-term threat to fiscal sustainability is limited, action will be called for to address longer-term challenges. Notably, the impact of ageing and mounting pressure from social security spending without corrective action will increase budget deficits and threaten sustainability. Current official projections suggest that health and long-term care spending, largely driven by ageing, is on course to rise by 3 percentage points of GDP by 2040 and social security spending by 2½ percentage points. A newer source of pressure on the government budget is meeting the targets to reduce greenhouse gas emissions to net zero by 2050. This effort will require investment upfront, but carbon pricing may lift revenues. As

such, meeting the climate change targets will have different impacts over time. Furthermore, a legacy of the pandemic is that the government holds larger contingent liabilities, to wit the doubling of loan guarantees to small enterprises to over 7% of GDP.

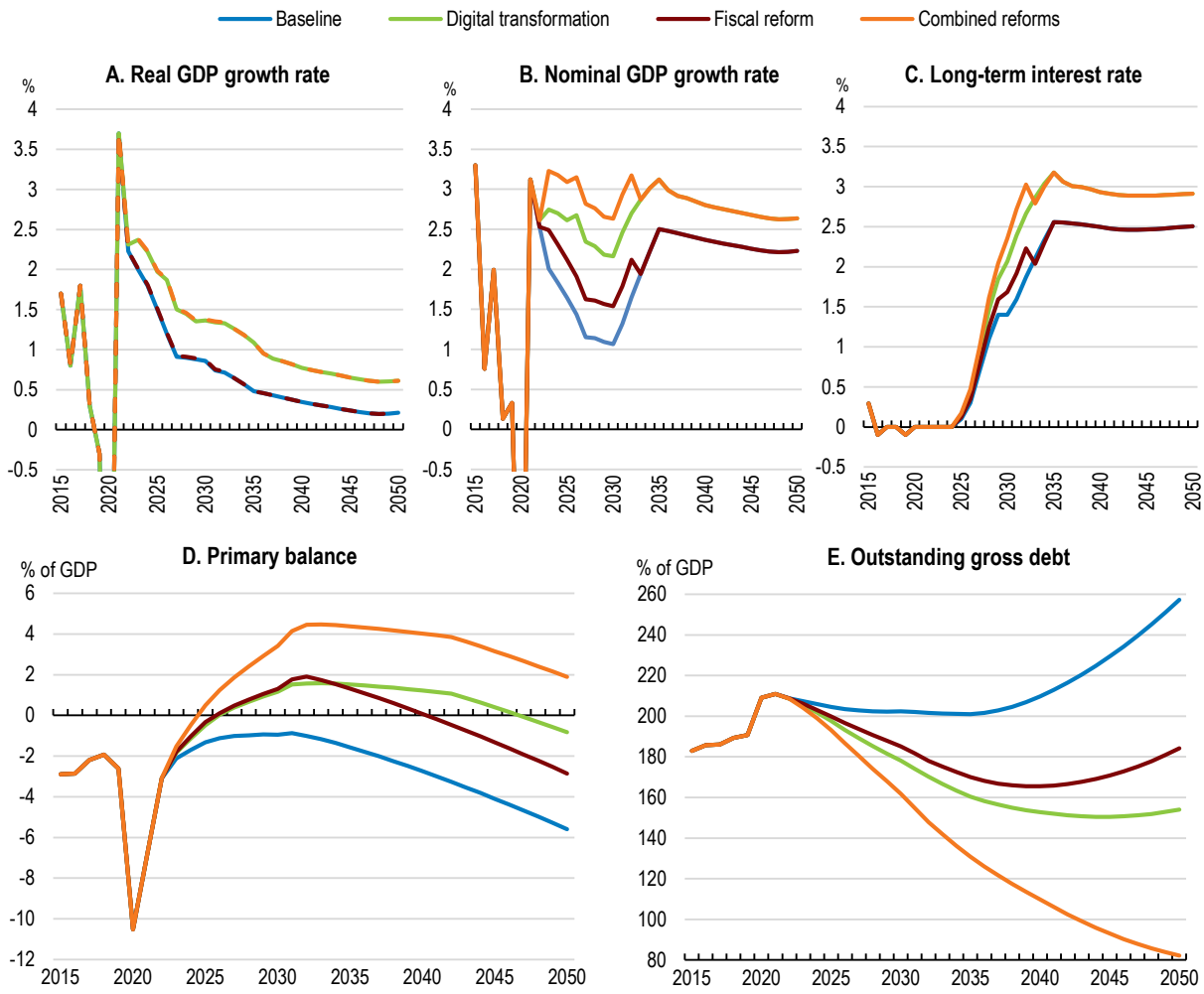
Incorporating these spending pressures in a simplified projection framework can give an indication of fiscal policy sustainability (Figure 1.14). For the baseline projections the path of the economy combines a baseline case of the Cabinet Office projection through FY2030 (Cabinet Office, 2021[21]) and the longer-run OECD projections (Guillemette and Turner, 2018[22]). Revenue projections are based on the Cabinet Office projections until FY 2030 after which GDP shares are kept constant (ageing may lower tax revenue, so these simulations may be overly favourable). Expenditure paths, which include the effects of ageing on health and long-term care and social security spending, take into consideration CPI or wage inflation and an ageing factor derived from the Cabinet Office projections. Long-term interest rates are determined by nominal GDP growth plus a term and risk premium. Effective interest rates are based on a nine-year moving average of long-term interest rates (which is the average tenor of Japanese government bonds).

In the baseline scenario, the debt ratio edges down over the short term, but as the economy slows and spending pressures intensify (due to ageing), budget deficits begin to widen and debt rises strongly beyond the 2030s, increasing by more than 50 percentage points of GDP by 2050 to around 260% of GDP. In the baseline simulation, fiscal policy is kept constant to examine the possible outcome if policymakers do not react. The results suggest that fiscal policy will need to adjust at some stage to ensure long-term sustainability. Options to do this are explored in additional simulations.

Progress towards sustainability was made prior to the pandemic, notably by the gradual increase in social security contributions over the years. Indeed, the share of social security contributions in general government revenue is large in comparison with other major economies (Figure 1.15). The consumption tax rate hike in October 2019 helped improve the fiscal position further, but the appetite for additional sizeable tax hikes is low, partly due to distributional consequences with low-income households particularly exposed to resultant price rises. Opportunities for cutting spending exist but government spending as a share of GDP is relatively small compared with many other OECD countries. Moreover, as noted, spending pressures are likely to intensify not only driven by ageing-related costs but also due to meeting greenhouse gas emission objectives.

In part, digital transformation could help contain the rise in spending over time and thus contribute to consolidation (see chapter 2). There are arguments to continue relying principally on consumption taxes for future consolidation needs once the economic recovery is secure. Indirect consumption taxes are a very efficient tax instrument and empirical evidence suggests that they are less damaging to economic growth (Johansson et al., 2008[23]). Similarly, making greater use of market-based instruments to meet greenhouse gas abatement goals could not only generate revenues in the short to medium term, but can help ensure that the unavoidable costs of the emission abatement needed to meet targets are minimised. Here again the distributional impact of these taxes will adversely hit low-income households. In this light, recycling some of the revenues raised to cushion the adverse initial impact of these measures is likely needed as part of a package to increase the chances of successful implementation (IMF and OECD, 2021[24]).

Figure 1.14. Long-term economic and fiscal projections



Note: horizontal axis shows fiscal years. Long-term interest rate is the yield on 10-year Japanese Government bonds. The primary balance and outstanding debt are based on the Cabinet Office definition (implying a somewhat lower debt ratio than the national accounts definition).
The longer-term projections up to 2030 are based on the baseline Cabinet Office projection (the Cabinet Office published a scenario with high economic growth and a baseline with slower growth).
The baseline scenario takes into account rising spending pressure stemming from ageing and holds current fiscal policy settings constant.
The fiscal reform scenario assumes the consumption tax rate is gradually increased from 10% to 20% and carbon tax from JPY 289/tCO2 to JPY 4000 over ten years beginning in 2023. Half of additional revenues are recycled to offset the economic shock.
The digital transformation scenario assumes a higher productivity growth rate and somewhat higher labour participation. Government spending is assumed to grow less robustly such that spending relative to baseline is 10% lower after 20 years.
The combined reforms scenario reflects the joint effect of the fiscal reform and digital transformation scenarios.
The real GDP growth rate of the baseline and the fiscal reform scenario are almost identical due to the assumption of recycling revenues to mitigate the shock. As a consequence, the paths of real GDP for the digital transformation scenario and the combined reform scenario are also almost identical.
Source: Cabinet Office (2021); OECD (2021); MHLW (2019); and OECD calculations.

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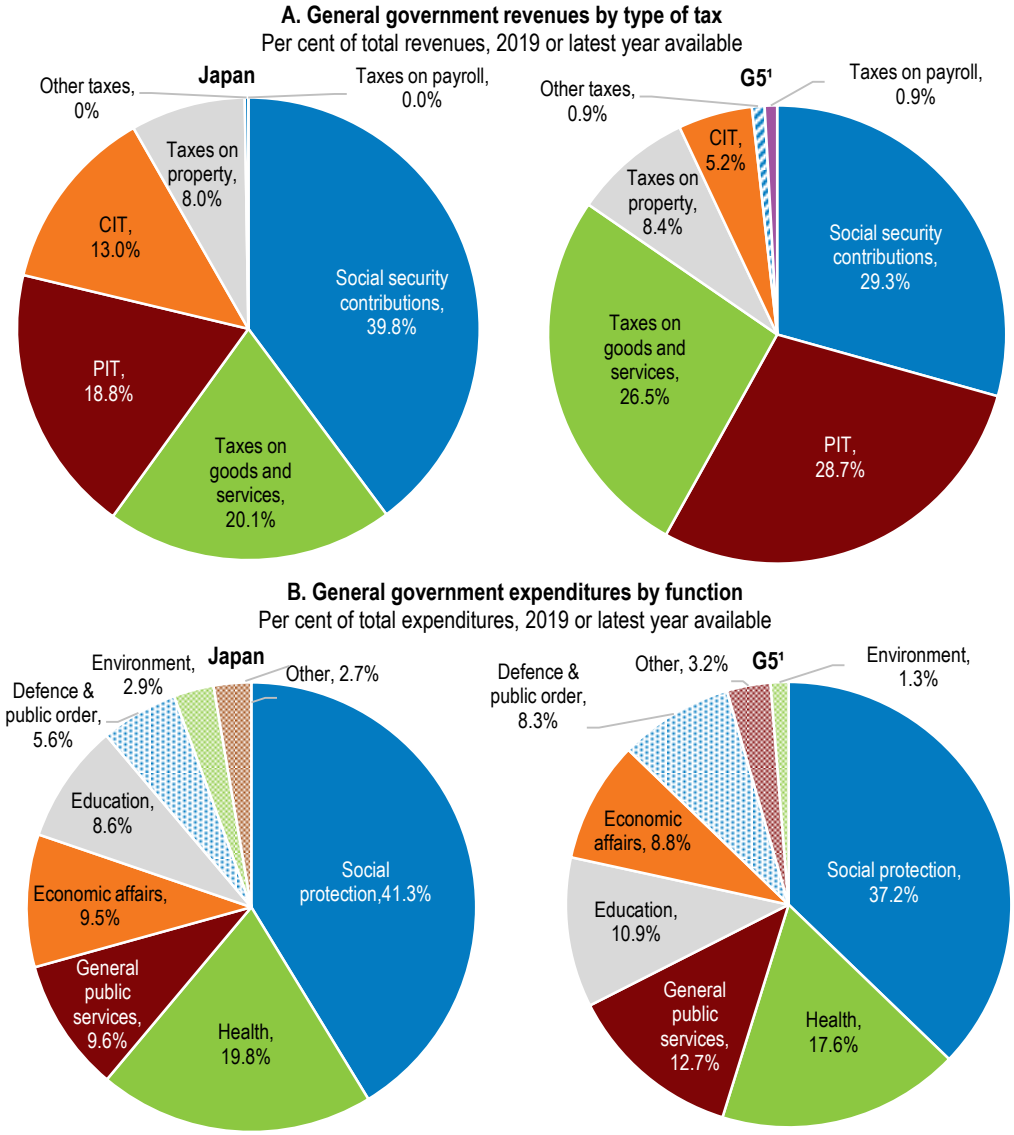
Figure 1.15. Composition of government spending and revenue



1. Unweighted average of France, Germany, Great Britain, Italy and the United States.
Source: OECD (2021), OECD Revenue Statistics and OECD National Accounts Statistics (databases).

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Against this background, the simulations also explore the impact of different packages of policies discussed in this Survey as means to improve fiscal sustainability, while taking into account growth and inclusiveness considerations:

- In a fiscal reform scenario, the consumption tax is raised gradually from its current rate of 10% to 20% and the carbon tax from the current JPY 289/tCO2 to JPY 4000/tCO2 between FY2023 and FY2033. Like in the previous *Economic Survey*, the simulation assumes a rise in the consumption tax rate of one percentage point a year over a decade (OECD, 2019[6]). The assumed rise in the carbon tax rate is steep, but starts from a very low base and will generate comparatively little revenue relative to the consumption tax, even at its peak before revenues taper off as the economy successfully reduces carbon emissions. A higher carbon price may be required to ensure carbon neutrality (Kaufman et al., 2020[25]). The consumption and carbon tax hikes increase consumer prices and reduce real consumption, with the effects estimated using the multiplier from the Cabinet

Office's Economic and Fiscal Model (Cabinet Office, 2018[26]). The path of spending assumes one-half of the tax increases are used to raise spending to offset the impact on output (consistent with the implementation of the 2019 consumption tax rate hike). Additional spending would involve public spending on active labour market policies, social benefits for families, investing in green innovation and supporting the digital transformation as outlined elsewhere in this Survey.

- In a digital transformation scenario, digitalisation and further investment in intangible assets are assumed to raise productivity growth by 0.3 percentage points relative to baseline (Saruyama and Tahara, 2020[27]). In addition, the labour force continues to benefit from increased participation rates as assumed in some projections (The Japan Institute for Labour Policy and Training, 2019[28]). On the expenditure side, possible efficiency savings from digitalisation are assumed to reduce spending by 10% relative to baseline and are phased in after FY2023 over 20 years.

In the fiscal reform scenario, gradual consolidation efforts improve the budgetary position until around the mid-2030s. At that horizon, the underlying budgetary pressures associated with ageing again begin to dominate and debt to mount. The digital transformation scenario builds in the possible impact of structural reforms, with higher productivity growth boosting GDP and improvements in cost effectiveness helping contain spending. However, here as well the gains are eventually insufficient as the underlying spending pressures again continue to rise and from the late 2030s to boost deficits and lead to increases in debt levels. In contrast, combining fiscal and structural reforms promoting digitalisation would keep fiscal policy sustainable until at least mid-century, keeping gross government debt levels on a downward path. While these simulations are sensitive to the assumptions used (Box 1.3), they clearly show that a combination of fiscal consolidation and structural reforms can help ensure long-run sustainability.

Box 1.3. Sensitivity analyses of long-term projections

The projections rest on a number of simplifying assumptions. For long-term debt sustainability analysis, the primary balance, interest rates and the GDP growth rate are critical. The difference between long-term interest rates and nominal GDP growth rates after 2030 is around 0.2%-0.3%, which is low compared to historical experience on average over long periods. However, there is considerable uncertainty about whether interest rates will remain subdued or rise once economic growth is again on a firmer footing. Additional simulations therefore assume that the interest rate-growth differential is higher or lower by one percentage point. The results of these assumptions for the baseline scenario and the combined reforms scenario are shown in Figure 1.16. In the baseline scenario, the debt-to-GDP ratio in 2050 would be 30 percentage points less (more) in the lower (higher) interest rate scenario.

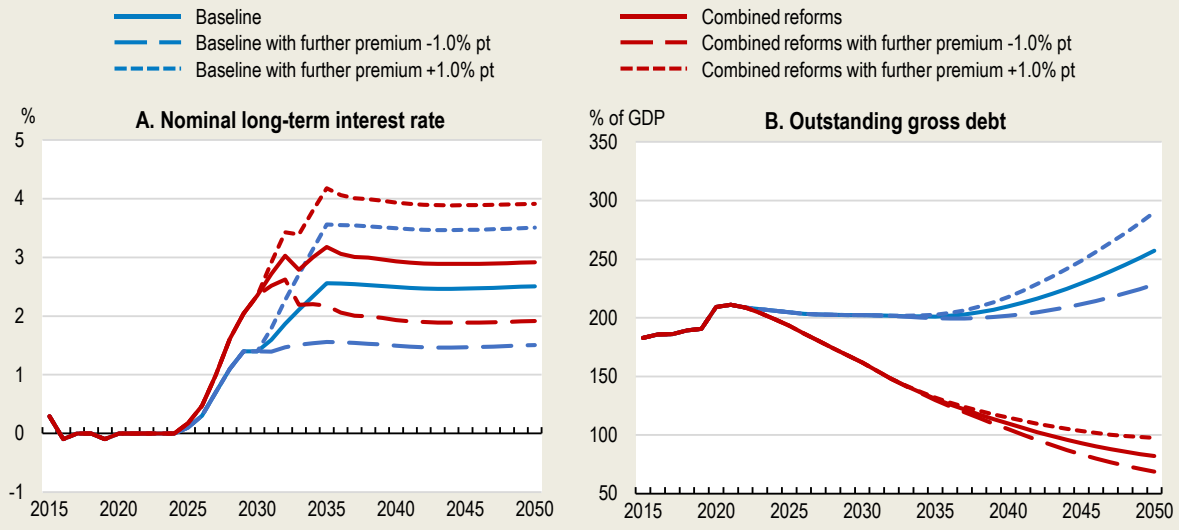
A second set of sensitivity analyses concerns the pace and timing of fiscal consolidation (Table 1.6). To explore this, the size of the assumed annual consumption tax rate hike is halved or the starting date of the tightening is pushed back to 2028. In both cases, debt levels in 2050 would be slightly above 200% of GDP and about 15 percentage points above the original fiscal reform scenario. These results are consistent with the previous OECD Economic Survey of Japan's finding that delay would ultimately increase the size of the required adjustment (OECD, 2019[6]).

Table 1.6. Delaying the consumption tax hike would affect debt sustainability significantly

Outstanding gross debt as a per cent of GDP in 2050

	Fiscal reform	Combined reforms
Main scenario Consumption tax rate raised by 1 percentage point per annum starting in 2023, to 20% Carbon tax rate raised over 10 years from 289 yen/tCO2 to 4000 yen/tCO2	184.1	82.1
Consumption tax rate raised by 0.5 percentage point per annum starting in 2023, to 20%	200.5	97.7
Consumption tax rate raised by 1 percentage point per annum starting in 2028, to 20%	201.2	98.2

Figure 1.16. The evolution of public debt is sensitive to interest rate assumptions



Note: Changes to interest rates are gradually phased in after 2030 over five years.

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The above debt sustainability analysis suggests that the potential boost to productivity from digitalisation is not sufficient to ensure long-run debt sustainability. Moreover, the risks around these simulations are likely large, not least the scope for future natural disasters that could knock the economy off course. In this context, debt sustainability requires complementing fiscal consolidation efforts with other structural reforms. The previous Economic Survey laid out the main elements of a strategy (OECD, 2019[6]). A comprehensive fiscal consolidation plan would include the following elements (the possible fiscal impact is reported in Box 1.4), some of which are already in train:

- Gradually raising further the consumption tax rate. In 2019, it was hiked from 8% to 10% − still amongst the lowest in the OECD (OECD, 2018[29]). The above simulations also include additional revenue from environmental taxes. Base broadening, particularly in the context of a reconfiguration of international taxation, offers additional means to raise more revenue at less cost to the economy.
- Constraining spending growth in health and long-term care by making more use of home-based care, generic drugs and co-payments. In addition, digitalisation could help improve spending efficiency. Trials already underway suggest that monitoring robots can alleviate pressure on medical staff (see chapter 2) and could thus complement these reforms.
- Rationalising the provision of local public services and infrastructure by promoting joint provision by local authorities. In the case of public investment and maintenance of the public capital stock, digitalisation may also help raise spending efficiency. Drones, robots and big data promise new ways to increase spending efficiency while reducing risks to workers.
- Raising the pension eligibility age above 65 while promoting continued work by the elderly. In May 2020, the government enacted the Pension Reform Act. The reform introduces actuarial adjustments for delaying retirement, which should increase incentives to remain in work. The upper age limit was extended from 70 to 75 years of age.

Table 1.7. Past OECD recommendations on achieving fiscal sustainability

Past recommendations	Actions taken
Develop a comprehensive fiscal consolidation plan covering specific spending cuts and tax increases, including a further gradual rise of the consumption tax, to ensure fiscal sustainability.	The consumption tax rate was raised from 8% to 10% in October 2019.
Take long-term care out of hospitals and shift its focus to home-based care. Promote greater use of generic drugs by making them the standard for reimbursement by health insurance and raise the co-payment rate of the elderly by establishing the ability-to-pay principle through an effective system for assessing income and assets.	A revision to the medical payment system in 2020 introduced additional incentives for hospitals and pharmacies to use generic drugs. The Act on Assurance of Medical Care for Elderly People was revised in 2021 and will double the co-payment rate of elderly person to 20% with income above a certain level, except for those with income comparable to the working age population whose rate is already 30%.
Promote the joint provision of local public services and infrastructure across jurisdictions and the development of compact cities	A revision to the Act on Special Measures Concerning Urban Reconstruction allows municipalities to develop together "local optimisation plans" to promote compact cities. Financial support is available for planning that extends beyond a single municipality's border.
Raise the pension eligibility age above 65 to maintain a sufficiently high replacement rate, while taking measures to expand the employment of older persons. Remove distortions in tax and social benefit systems, such as the spousal deduction, that discourage labour force participation, while increasing the coverage of firm-based social insurance.	Pension reform has increased the upper age limit of deferring the old-age pension to 75 and expanded actuarial adjustments for workers retiring after the age of 65. Related acts were revised in 2020 to expand the coverage of employee insurance (pensions and healthcare) for part-time workers, covering firms with more than 100 employees from 2022, and firms with more than 50 employees from 2024.

Box 1.4. Illustrative fiscal impact of proposed reform measures

The estimated budgetary effect of the reforms proposed in the report are reported in Table 1.8. These effects are illustrative. In practice, the design of policies may differ, such as the period over which they are phased in and whether flanking measures are adopted, including the recycling of revenues to address distributional goals. For example, the effect of raising the consumption tax in the debt sustainability analysis is lower than the policy effect reported in the table because of the assumption to use revenues raised from this tax to offset the impact of a higher tax rate on the most vulnerable households.

Table 1.8. Illustrative impact of proposed reforms on the budget

Per cent of GDP

	2025	2035	2045
Consumption tax rate raised by one percentage point per annum starting in 2023, to 20%	+1.6	+5.2	+5.2
Carbon tax raised linearly to JPY 4000 per tonne of CO2 from 2023 to 2032	+0.2	+0.3	+0.1
Reforms in social security expenditures with digitalisation (efficiency improves by 10% from 2023 over 20 years)	+0.2	+0.7	+1.3
Reforms in local government expenditures with digitalisation (efficiency improves by 10% from 2023 over 20 years)	+0.2	+0.7	+1.3
Raising the pension eligibility age from 65 to 75 from 2025 over 30 years	0.0	+0.3	+0.6

Note: The impacts reported are on the fiscal balance of central and local governments.
The impacts of a consumption and carbon tax hike do not include additional fiscal measures for mitigating their socio-economic impact (half of the additional revenue in the fiscal reform scenarios).
To estimate the impact of raising the pension eligibility age, labour force participation rates in age groups 60-64, 65-69, 70-74 and 75-79 in 2040 and 2055 are assumed to be the same as for five-year younger groups in 2025 and 2040, respectively, and annual salary in age groups 60-64, 65-69 and over 70 in 2040 and 2055 area assumed to be the same as for five year younger groups in 2025 and 2040, respectively. The estimated impact only takes into account the increase in income tax revenue.
Source: Ministry of Internal Affairs and Communications; Ministry of Health, Labour and Welfare, Cabinet Office; OECD calculation.

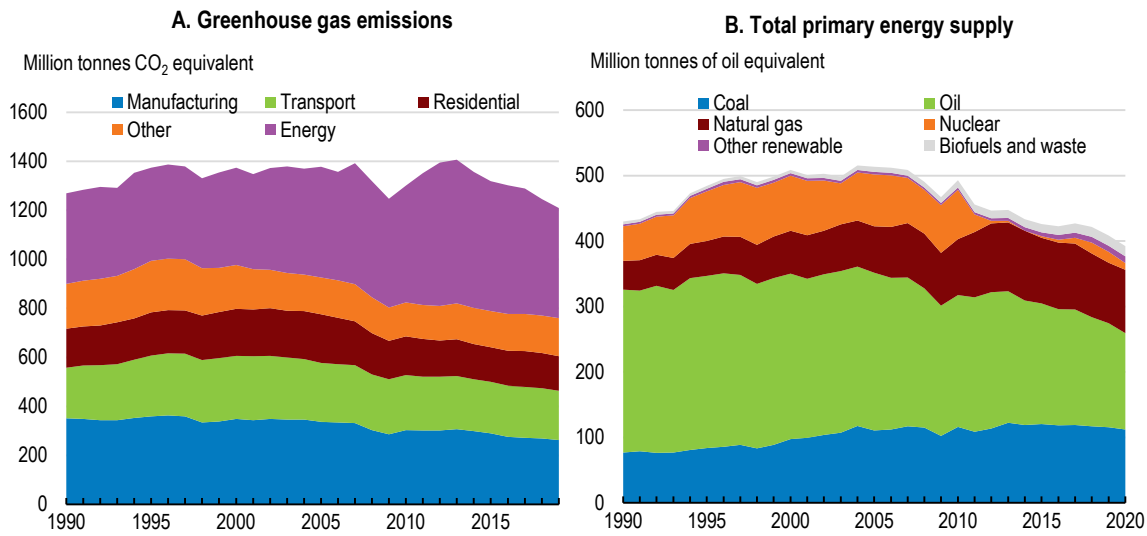
Ensuring long-run environmental sustainability

Long-run environmental and fiscal sustainability are interdependent. Ambitious goals to reduce greenhouse gas emissions will require government intervention, either through spending which will ultimately require additional fiscal revenue, such as from carbon pricing, or by imposing regulations, which will set an implicit price on emissions. In either case, such measures will weigh on economic activity. A well-designed package of policies can minimise economic costs while ensuring climate change objectives are met.

Progress in reducing emissions has been steady recently

Greenhouse gas emissions peaked in 2013 (Figure 1.17), as the Tohoku earthquake and tsunami and subsequent nuclear accident led to the shutdown of nuclear power plants and increasing reliance on fossil fuels (Box 1.5). Since 2013, greenhouse gas emissions have declined steadily, notably through greater energy efficiency and the wider use of low-carbon electricity. The energy sector is the largest emitter of greenhouse gases and its share has grown since the beginning of the century, though it has begun to decline more recently. As the restart of nuclear power was only very gradual, energy production has relied on a growing share of renewables and imported fossil fuels. The latter still accounted for 88% of total energy supply in 2019.

Figure 1.17. Emissions remain elevated due to shifts in energy supply



Source: OECD Greenhouse Gas Emissions database; and IEA World Energy Balances database.

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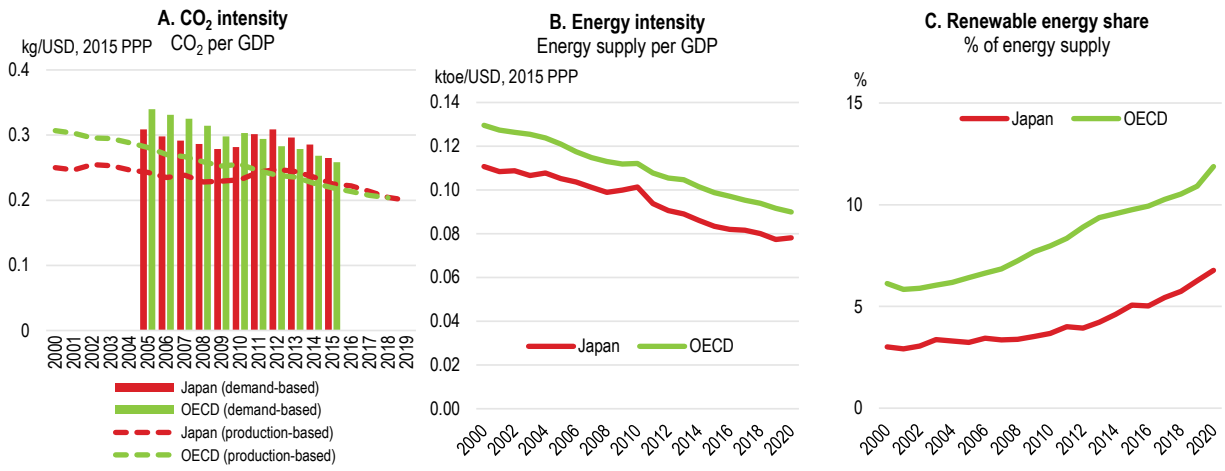
Economic activity and greenhouse gas emission have thus decoupled, although the advantage over the OECD average has been eroded as other countries have made sizeable gains (Figure 1.18). Japan stands out as one of the most energy efficient economies, owing in part to tightening energy efficiency standards for products, vehicles and housing. Widespread efforts to reduce energy demand to relieve pressure on the electricity sector after the Tohoku earthquake have had lasting effects. Current projections of energy use suggest a declining population, shrinking demand, and ongoing increases in energy efficiency will offset demand driven by economic growth.

Figure 1.18. Low energy intensity and increasing renewables have helped decoupling



Note: Included are CO2 emissions from combustion of coal, oil, natural gas and other fuels. GDP is in constant 2015 USD using PPP.
Source: OECD, Green Growth Indicators; OECD, Environment Statistics database; OECD, National Accounts database; and IEA, World Energy Statistics and Balances database.

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Box 1.5. Restructuring after the Tohoku Earthquake

In March 2021, the tenth anniversary of the Tohoku Earthquake, the subsequent tsunami and then the catastrophic failure of the Fukushima nuclear reactor was commemorated. The succession of disasters was one of the costliest in recent history, with almost 20,000 people losing their lives or disappearing as a result, and over 470,000 people evacuated. Housing, factories and farms were destroyed and land was contaminated by radiation. The legacy of these events is still being felt today. Early estimates of the costs of the destruction were up to around JPY 17 trillion (3% of annual GDP) (OECD, 2011[30]). Dealing with the consequences has required JPY 31.4 trillion of government spending between 2012 and 2020 (Reconstruction Agency, 2021[31]). Substantial further costs will have to be incurred to deal with the nuclear power plant and to complete decontamination (METI, 2016) (JCER, 2019[32]).

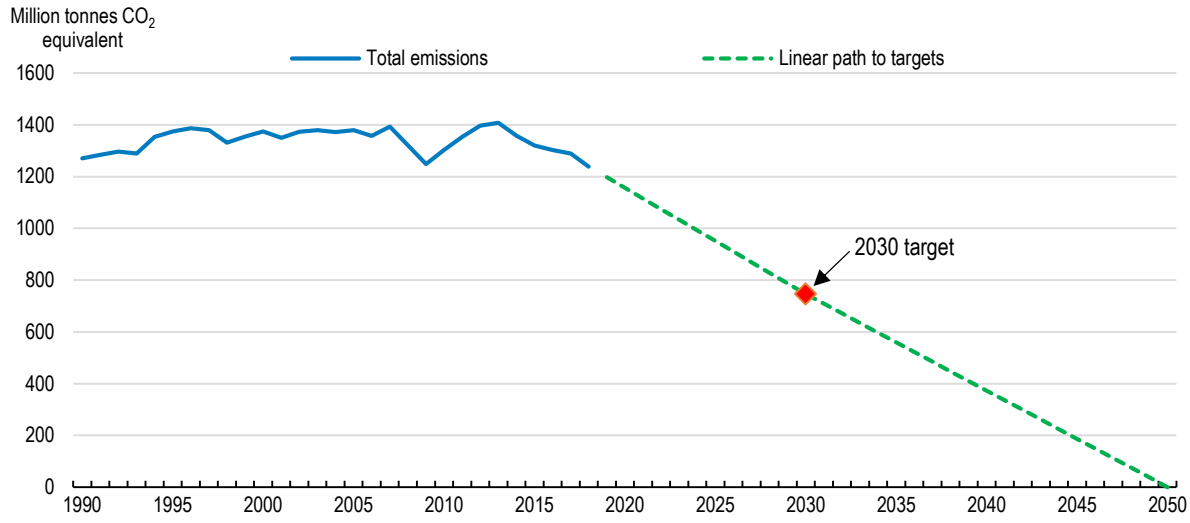
The Fukushima prefectural government has been restructuring the economy, restoring sectors such as tourism and agriculture, but also targeting renewable energies and promoting digitalisation with the support of the Ministry of Economy, Trade and Industry as part of the Fukushima Innovation Coast Framework. For example, Fukushima is the site of a major hydrogen demonstration project examining the possibilities of lowering the cost of hydrogen production as well as adjusting demand in the power grid by changing the production of hydrogen. This is achieved by a large solar energy facility (20MW solar photovoltaic) that can either produce electricity for the grid or produce hydrogen (by a 10MW electrolyser) for fuel cells and vehicles thereby storing the energy produced and reducing the intermittency problem. Other sectors receiving support includes medical, robot and drone-related industries. Fukushima is a major supplier of medical devices, both nationally and internationally, with new initiatives exploring how new technologies can help an ageing population. Support is also available in Fukushima for developing robots for use during disasters.

The government has made strong commitments to reduce emissions

In 2020, the government committed to a net zero greenhouse gas emission goal by 2050. In 2021, it committed to a new intermediate target of reducing these emissions by 46% of the 2013 level in 2030 (and

by 50% if possible), as against an original Paris Agreement target of a 26% cut (Figure 1.19). The intermediate target's horizon is relatively close and major infrastructure projects to switch energy mixes will likely prove difficult to complete in such a timeframe if permits and licenses need to be secured. Such a switch is feasible as renewable generation facilities have relatively short construction times. However, - as discussed below - complementary investments in network infrastructure and demand-side management will be needed.

Figure 1.19. Greenhouse gas emission targets are challenging



Note: The dashed line gives the implied linear reductions needed to meet the 2030 target and then reduce emissions to zero in 2050. Carbon capture, utilisation and storage would allow emissions to remain higher than the dashed line while still meeting the net zero emission target.
Source: OECD greenhouse gas emissions dataset and calculations.

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Successive governments have adopted a wide range of policies to reduce emissions. The *Green Growth Strategy* adopted in 2021 identifies 14 promising sectors that would contribute to meeting climate change targets (METI, 2021[33]). While OECD-wide analysis suggests that available technologies are sufficient to meet 2030 targets (IEA, 2021[34]), research and development is key as existing technologies are unable to deliver all the promised emission reductions to meet the net zero emission target by 2050. The government's emission abatement plans are integrated into energy policy, which through a series of *Strategic Energy Plans* pursues energy safety, security, economic efficiency and environmental sustainability. Energy security is important given Japan's reliance on imported energy. Furthermore, coal and natural gas remain important sources of supply which constrains mitigation options until the infrastructure is in place to expand significantly the share of renewables or carbon capture, utilisation and storage and mixed combustion technologies are available and cost effective.

Major efforts will be needed to meet climate goals

In the energy sector, some of the hardest choices need to be made to ensure meeting the net zero emission target by 2050. The Green Growth Strategy estimated that renewable generation could potentially cover 50-60% of total electricity generation in 2050, from around 17% in 2018 (METI, 2020[35]). While new policies are still being developed it is unlikely that they will be less ambitious. Japan's renewable share is below the OECD average, although it has been increasing quite rapidly. This is particularly the case for photovoltaic power after generous subsidies were given (in the form of feed-in tariffs) from 2012. Japan had some of the highest feed-in tariffs in the world. As a next step, a system of support through a feed-in

premium will be introduced in 2022 with the aim of better integration with electricity markets and continuing support for further expansion of renewables. The shift from a feed-in-tariff to a feed-in premium has occurred in other OECD countries as they expanded their renewable generation capacity. In addition, countries also use auctions to allocate support (IEA, 2018[36]), which can help ensure the level of support diminishes over time, when feasible, and also becomes technologically neutral (AURES, 2019[37]).

A major constraint to the expansion of renewable energy is the fragmentation of the electricity network into regional grids, which may be aggravated by additional renewable generation being sited away from the major demand areas. Indeed, offshore wind and the more experimental tidal generation capacity have just started to be developed. Japan is also unusual in that the grid developed using two different frequencies (60 Hz in the west and 50 Hz in the east) with limited interconnector capacity. A high share of intermittent supply and distributed generation is hard to balance in smaller networks, which limit pooling and allow for less flexibility, ultimately threatening network security and thereby putting constraints on the contribution from renewable generation. The authorities have begun to take stronger action to improve network resilience, as advocated in previous *OECD Economic Surveys* (OECD, 2019[6]). Reforms in 2020 introduced transmission charges to support investments in the transmission and distribution network and the feed-in premium to integrate renewable energy into the electricity market more effectively. These steps will strengthen the ability of the grid to deal with more supply from renewables. The previous *OECD Economic Survey* also advocated ensuring competition in the electricity market, as incumbents with market power have incentives to hinder the development of renewables (Dong and Shimada, 2017[38]). In order to ensure neutrality of the electricity transmission network, legal unbundling was introduced in 2020. The competition authorities will need to evaluate its impact. Further measures to increase competition, transparency and market liquidity may be needed. Harnessing digitalisation by making use of smart grids and by increasing demand flexibility may help to mitigate supply volatility of renewable energy supply and network constraints.

A second set of issues revolves around nuclear power. In order to meet the 2030 target, current plans assume that its share in energy generation rises to around 20-22%, replacing fossil fuels. Restarting more of the existing plants will require close adherence by the nuclear operators to the regulator's demand to satisfy considerably strengthened safety and performance requirements as well as continuing efforts to reassure the public that the risks are understood and contained. The government in 2020 passed a further act that requires stricter accident-prevention measures for nuclear power. As of July 2021, the Nuclear Regulation Authority had granted permission to restart to 16 nuclear power plants, of which 10 have already started operations. The remaining six applications are being reviewed. In 2021, the Nuclear Regulation Authority blocked the restarting of one nuclear power plant due to safety concerns. Research and development of new nuclear technologies such as small modular reactors is underway. With improved safety and performance features, they could contribute to reducing emissions.

Other options in the energy sector are contingent on the outcomes of ongoing research and development:

- Hydrogen and ammonia are options and already a number of applications exist, but currently they are relatively expensive. Japan is one of the first countries to develop a hydrogen strategy and a number of demonstration projects are underway. Plans to reduce costs by one third, making it competitive with natural gas, would allow hydrogen to replace fossil fuels in sectors such as transportation and industry. In addition, ammonia, as well as hydrogen, can be used for power generation and maritime transport. Ammonia can be used for power generation by remodelling existing thermal power plants (co-firing) and thereby contribute to decarbonisation, while providing stable electricity supply and avoiding lock-in. Ammonia can be supplied at lower cost than hydrogen due to the existing raw material transportation and storage networks for the production of goods such as fertilisers. The Green Growth Strategy estimated that hydrogen and ammonia generation could potentially cover about 10% of total electricity in 2050. France and Germany have also launched plans in this area, including subsidies to support the roll-out of fuel cells in transport. In France, the support measures during the pandemic targeted "green" hydrogen – producing

hydrogen when electricity supply exceeds demand thus storing electricity. A similar approach is being trialled in Fukushima (Box 1.5), which could be extended to help balance electricity markets as hydrogen costs fall.

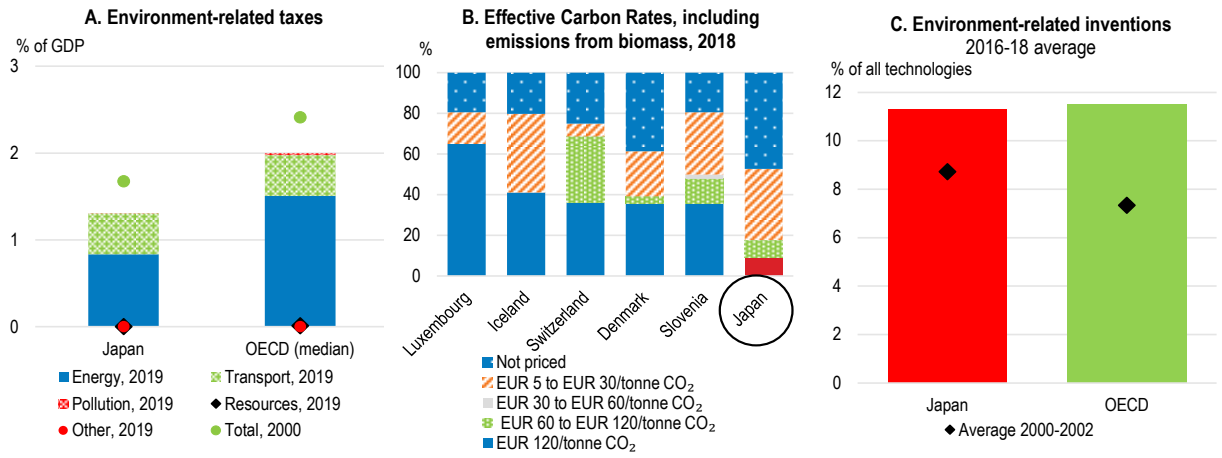
- Carbon capture, utilisation and storage is another largely experimental option, but by 2050 its roll-out could allow coal-fired power to contribute to meeting a sizeable, though as yet undetermined, share of electricity demand. Due to Japan's current heavy reliance on fossil fuels to provide baseload power, the costs of switching totally out of these in a relatively short time span, by means other than a restart of a larger share of its nuclear fleet (currently nuclear generation accounts for around 7½ per cent of electricity production), would be extremely high. The average age of the coal-fired fleet is estimated to be around 25 years, whereas the normal retirement age is around 40 years (Climate Analytics and Renewable Energy Institute, 2018[39]). The government estimates that replacing inefficient coal-fired generation plants with newer ones with capture carbon could also reduce emissions over and above the gains in generation efficiency. However, the impact of the proposed recycling - for example to methane to be used as a fuel or as a chemical fertilizer – on emission reduction remains uncertain (IEA, 2021[40]). As such, major investment in new coal-fired capacity should be contingent on progress in developing new decarbonisation technologies - such as carbon capture utilisation and storage and ammonia co-firing - and cost-benefit analysis.

Achieving emission reductions in the transport sector will likely require further investment. The government currently supports emission reductions from the car fleet through a mix of tax incentives and purchase subsidies. The Japanese automotive industry has pioneered electric (hybrid or purely electric) and hydrogen-based vehicles using fuel cells, and is both a major global supplier and a large domestic market. Expanding the charging infrastructure is needed to make greater use of electric vehicles, which is supported by a subsidy for their installation. Indeed a major expansion of battery electric vehicles or plug-in hybrid electric vehicles is envisaged to around 20-30% of the automotive fleet in 2030 (IEA, 2021[40]). In the medium term, the development of fuel cell vehicles is envisaged. Production capacity for hydrogen-powered vehicles is currently small and the network of hydrogen stations for fuel cell vehicles is only just beginning to be established. Government support policies in this field should periodically assess their contributions to emission reductions to prevent marginal abatement costs diverging and thereby increasing the overall costs of emission reduction. The experience of other countries suggests that in some cases actual reduction achieved in operational settings can be quite different from *ex ante* expectations (Plötz, Funke and Jochem, 2018[41]).

Making more use of market-based instruments

Energy and climate policy has often taken a regulatory approach complemented with voluntary agreements with major private sector actors. Periodic systematic and transparent evaluation of marginal abatement costs is called for to ensure that the policies being developed are not excessively costly. Market-based instruments are relatively less used, although a carbon tax exists (Figure 1.20). However, the effective carbon rate - which assesses the combined impact of fuel excise taxes, carbon taxes and emission permit prices - is relatively low in comparison with other OECD countries (the share of energy-related carbon emissions priced at a EUR 60 per tonne of CO_2 benchmark stood at 24% in 2018 (OECD, 2021[42])). Furthermore, like in other countries, a slew of exemptions means that many emissions are not subject to a carbon price and that effective rates vary by sector. The specific climate change mitigation tax rate of JPY 289 (USD 2.72) per tonne of CO_2 is one of the lowest rates in the OECD and has a rather narrow base covering coal and petroleum (when taking into account other energy taxes the price per tonne of CO_2 would rise to JPY 4057 – or around EUR 30), which is lower than the OECD average of around EUR 50). On the other hand, the high level of support offered by feed-in tariffs has pushed up the price of electricity. Some prefectural governments have implemented their own measures, such as the linked emission trading schemes in Tokyo and Saitama, and other cities have adopted their own climate change goals. The emission trading schemes are rather small as they exclude manufacturing and the residential sector.

Figure 1.20. Market-based instruments are relatively underused



Note: in panel B, data refer to the share of emissions priced, in per cent, including emissions from the combustion of biomass.
Source: OECD, Environmental policy: Environmental policy instruments; OECD, Environment Statistics database; OECD, Effective Carbon rates; and OECD, Patents in environment-related technologies: Technology indicators.

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Given the major infrastructural requirements for making the energy sector transition to meet the net zero emission target, government spending will need to remain elevated in this area. As the government also needs to ensure fiscal sustainability, making more use of market-based instruments is warranted. Not only will they generate revenue (at least in the short to medium run), and thus contribute to both environmental and fiscal sustainability, but they will also help minimise the costs of reducing emissions. The government is currently evaluating the options of using market-based instruments, such as carbon taxes, emission trading schemes or carbon credit markets, as part of a broader strategy. A voluntary trading system (the J-Credit Scheme) is already in place for some companies and local authorities, wherein the government certifies emission reductions, which could provide a basis along with the existing carbon tax and regional trading schemes to develop policy further. Experience in other countries suggests that effective carbon rates in trading systems need to be higher and more stable to make a durable contribution to abatement (OECD, 2021[42]). As such, design will be important and will need to consider auctioning the permits.

Market-based instruments are important but unlikely to meet emission objectives on their own. The rise in tax rates needed to reduce emissions where demand is inelastic in the short run can be penal (Heal, 2020[43]). In these cases, short-run adjustment costs can be extremely high for households and firms, which introduces political constraints. Furthermore, electricity prices are already relatively expensive for end users in Japan, which may hinder a move to greater reliance on electricity. Against this background, easing adjustment costs with subsidies (while preserving incentives to reduce emissions), investing in R&D, and the use of regulation all play an important part of an overall policy. Regulation, such as energy efficiency requirements, has already contributed to high levels of energy efficiency in Japan. Elements of the Green Growth Strategy are in line with a multi-prong strategy. Nonetheless, cost-benefit analysis is required to ensure that overall costs are minimised.

Table 1.9. Past OECD recommendations on ensuring environmental sustainability

Past recommendations	Actions taken
Develop a low greenhouse gas emission development strategy with a horizon of 2050.	A zero net emission target and a Green Growth Strategy have been adopted for 2050.
Strengthen competition in electricity markets by ensuring that the transmission systems operator is fully independent from the vertically-integrated incumbent utilities and expand interconnection capacity.	Legal unbundling was introduced in 2020. A mechanism has been established to fund interconnection and transmission capacity expansion.
Gradually increase the effective carbon price, while taking account of the social and economic impact.	No action taken.

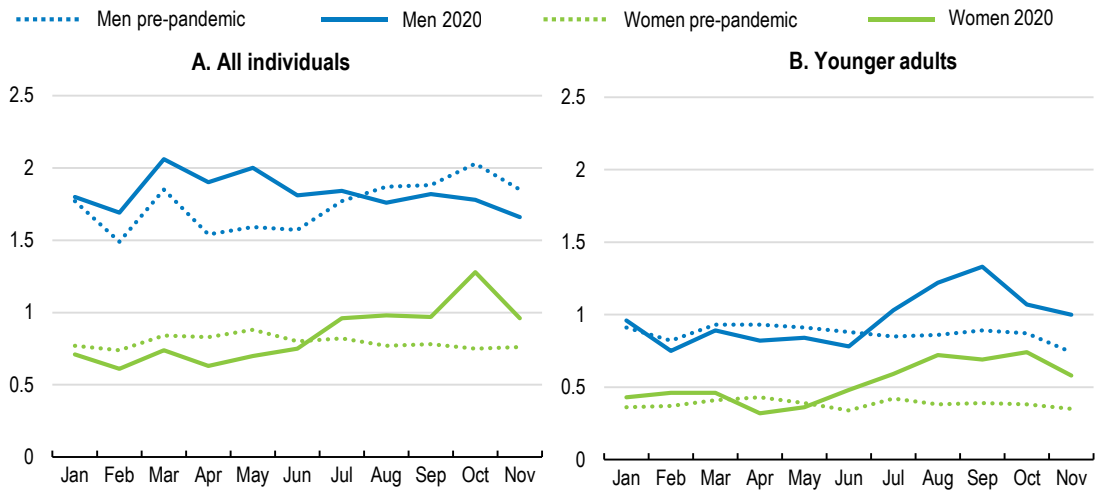
Preserving well-being and raising employment

While significant fiscal support appears to have cushioned the blow, the shock of the pandemic on households was sizeable. Limited capacity to conduct administrative procedures online, by both households and government, and the poor integration of government databases hindered getting support to the most vulnerable workers and households. It is likely also leading to widening inequality. The rise of single-person households and nuclear (not multigenerational) families leaves many households exposed to income shocks, even as poorer households have fallen behind in recent decades (adjusting for household composition) (Hori, Maeda and Suga, 2020[44]).

As the pandemic wore on, the suicide rate rose during 2020 and by the end of the year was significantly higher than in the pre-pandemic period (Sakamoto et al., 2021[45]). By contrast, the suicide rate in the United States fell in 2020 (Ahmad and Anderson, 2021[46]). The increase in suicides in Japan was notable for women and younger adults, although their rates of suicide are lower (Figure 1.21). These groups are over-represented (given their population shares) in the sectors facing the largest pandemic-related shocks, such as restaurants and tourism, and are also more likely to be in non-regular employment and thus exposed to greater employment precariousness.

Figure 1.21. Suicide rates rose as the pandemic wore on

Suicide rates per 100,000



Note: Pre-pandemic is the average suicide rate per 100,000 between 2016 and 2019. Younger adults are below the age of 30.
Source: Sakamoto et al. (2021).

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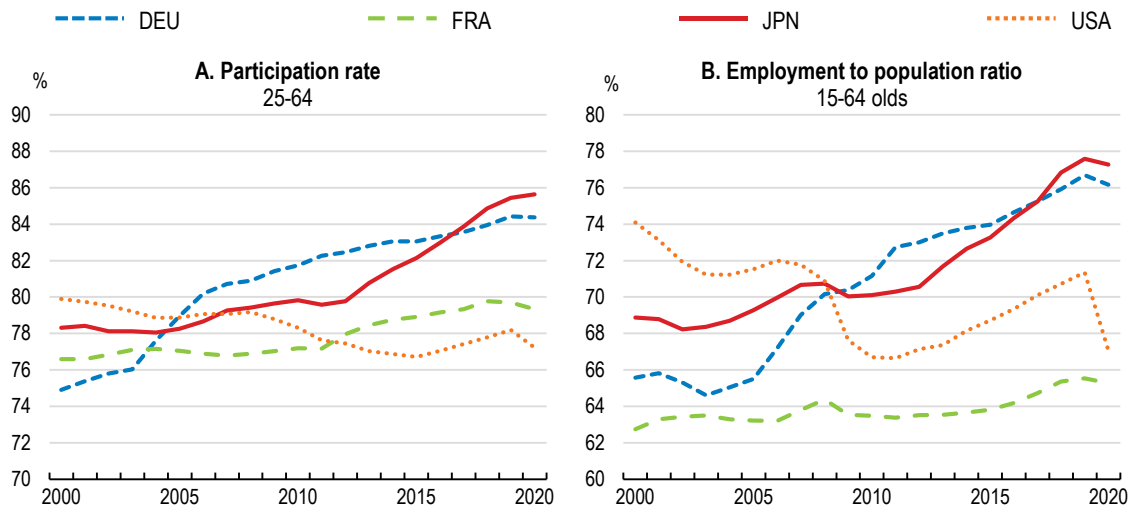
The pandemic raises the risk of another so-called ice age generation (Ohta, Genda and Kondo, 2008[47]). In past recessions, the failure of newly-minted graduates to enter employment has resulted in persistent relatively poor labour market performance over time by that cohort with lower wages and less secure employment outcomes. This underscores the need to secure a strong recovery and help this group into work or provide them additional training, notably to improve their digital skills.

The worsened labour market conditions mark a setback from the 2018 *Work Style* reforms and previous labour market reforms that were beginning to have some effect in conjunction with underlying trends towards increased participation and macroeconomic policy support (Kawaguchi, Kawata and Toriyabe, 2021[48]). Efforts to raise the compulsory retirement age that firms set for their own employees (OECD, 2017[49]), which has been at quite early ages, were starting to pay off. In addition, empirical evidence links reforms to expand social insurance coverage to non-regular workers with increased participation and hours

worked (Yamada and Mehr, 2021[50]). The impact of the reforms appeared to offset pressures from ageing, with Japan now having one of the highest participation rates amongst G7 countries (Figure 1.22). Participation rate increases for elderly cohorts are even more pronounced. The rise in the employment-to-population ratio is also amongst the highest along with Germany, which made substantial progress in raising participation among the elderly following the introduction of labour market reforms in the early 2000s (Turner and Morgavi, 2020[51]).

Figure 1.22. Labour market reforms have helped boost participation and employment rates



Source: OECD, Labour Force Statistics.

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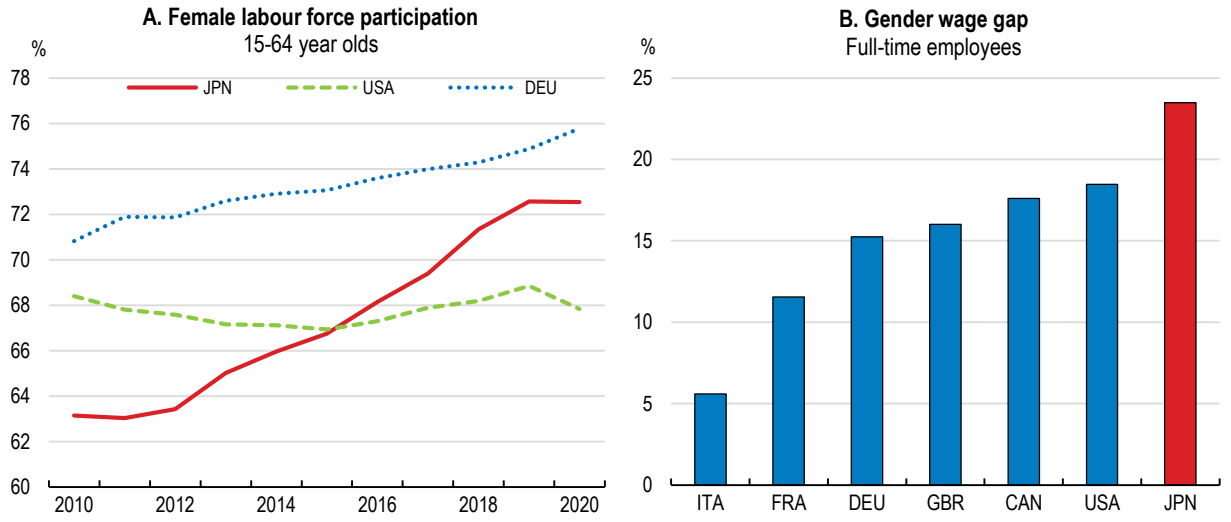
In addition to the elderly's, women's labour force participation has risen quite strongly (Figure 1.23). The government has sought to improve working conditions for women. For example, limits on working hours and the provision of childcare places had pronounced effects on labour supply by young mothers helping them remain in and return to employment (Nagase, 2018[52]). More recently, the number of childcare facilities has been increased further, partially funded by revenues raised from the consumption tax hike in 2019. Demand for childcare places remains unmet and places are rationed. Other measures included enhancing the attractiveness of the parental leave system, which often acts as a barrier to participation in other countries as well (OECD, 2016[53]). However, take-up is still far from complete, especially by fathers. In addition, central government, local governments and employers with over 300 regularly employed workers (from April 2022 this requirement will be extended to employers with over 100 workers) are required to establish gender action plans and disclose related information. Such actions are now promoted in the Corporate Governance Code, following revisions in June 2021. The revision requires listed companies to publish their policies and measurable voluntary goals for ensuring diversity in middle-management positions, including the promotion of women. Although the gender pay gap remains pronounced for Japan, it has been falling gradually from around 33% at the beginning of the century. These initiatives and the recently enacted *Work Style* reforms, by capping overtime hours and encouraging equal pay for equal work, will erode further some of the remaining disincentives for women to participate and raise their relative earnings.

Figure 1.23. More women are participating but large wage gaps persist



Note: In panel B, data for Canada, Japan, United Kingdom and United States refer to 2020, data for Germany refer to 2019, and data for France and Italy refer to 2018.
Source: OECD, Labour Force Statistics.

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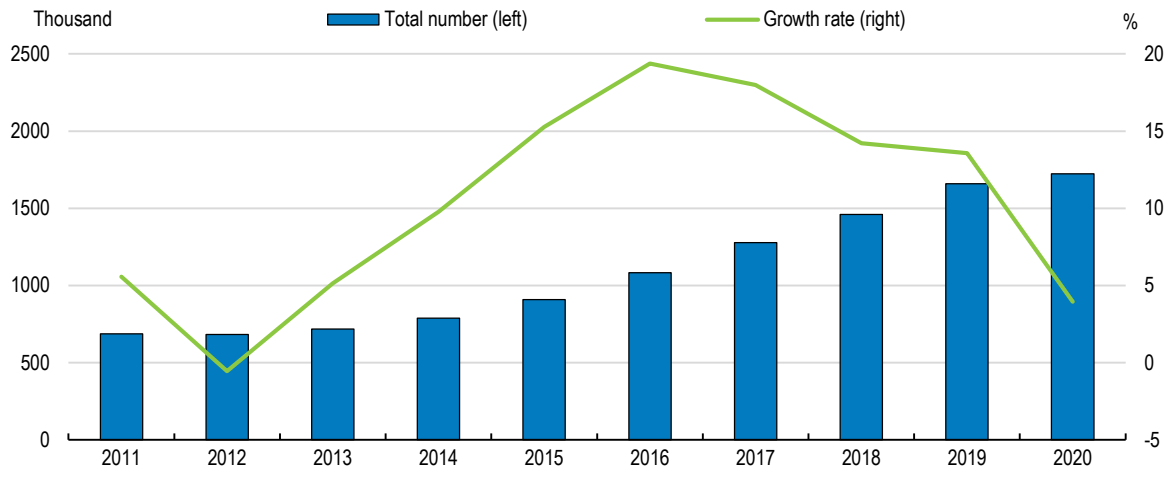
While employment has continued to expand, so has the share of part-time and non-regular employment, aggravating labour market dualism. Non-regular workers, such as temporary employees, are often the margin for adjustment during a shock because layoffs of regular workers can be very expensive. The recent *Work Style* reforms, including by encouraging equal pay for equal work, have begun to erode the dualism. Indeed, the number of women in regular employment had been increasing steadily, including during the pandemic. But more can be done to promote greater labour market dynamism. Previous OECD Economic Surveys have recommended reducing employment protection for regular workers (by lowering the costs of dismissal for these workers), expanding social insurance coverage and training for non-regular workers, avoiding that workers have to leave the labour force to care for children or elderly relatives and capping the number of hours worked (OECD, 2019[6]). Reducing dualism further would help augment pensions, facilitate greater labour mobility (particularly if career track programmes diminished in importance and mid-career mobility and re-entry of caregivers into regular contracts was supported) and reduce the current training disparity between regular and non-regular workers.

Pension system reforms in early 2021 help in this respect. Following on from earlier reforms that expanded the coverage of Employees Pensions Insurance (EPI) to include part-time workers in firms with more than 500 workers (OECD, 2019[6]), the new reform reduces that threshold to firms with over 100 employees and then 50 employees, which could bring another 650,000 workers into this pension system. Moreover, deduction of pension insurance contributions at source under the EPI would prevent non-regular workers from failing to pay their contributions, which is currently an issue. Non-regular workers covered by the EPI would have higher contribution rates and benefit from the employer's pension contributions and thus enjoy higher retirement income in the future. The government should strengthen measures to reduce the number of firms that fail to pay the employer share of pension contributions.

On current projections, the pressure on the labour market from ageing will peak during the 2050s. Efforts to mitigate this effect on labour supply involve continuing to implement the recent reforms, carrying out plans to raise the mandatory retirement age of civil servants and introducing actuarial adjustments to deferred pensions. In addition, improving older workers' training and skills will help preserve attachment, particularly in an era of technological disruption associated with the digital transformation. Providing training is more of a challenge for non-regular workers, for whom firm-based training is often limited. At

present, though improvements are being made, there are still disincentives to participation for second earners embedded in pensions and healthcare, such that some dependent spouses can also benefit without making contributions. Removing these implicit subsidies for non-participation would further support greater labour market participation. Finally, against the background of an ageing and shrinking population, boosting the number of foreign workers can help raise labour supply. Given strong labour demand and policy changes, foreign worker inflows increased substantially in recent years (Figure 1.24). The government introduced the Points-Based System for Highly-Skilled Foreign Professionals in 2012. In addition, further progress on this front has been made with the Specified Skilled Worker System that was introduced in 2019 to extend the coverage for foreign workers with specific skills and expertise, but immigration flows have remained relatively low and halted during the pandemic. As a result, the number of Specified Skilled Workers remains considerably short of initial estimates (around 32 thousand as of July 2021 against 345 thousand expected by 2024). The government should continue to build on current immigration policies to increase labour supply.

Figure 1.24. The number of foreign workers has increased



Source: Ministry of Health, Labour and Welfare.

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Table 1.10. Past OECD recommendations on mitigating the decline in the labour force

Past recommendations	Actions taken
Abolish the right of firms to set a mandatory retirement age and reinforce legislation against age discrimination.	In 2020, laws were revised to promote prolonging or abolishing compulsory retirement ages in firms starting from 2021.
Strictly enforce the new 360-hour annual limit on overtime hours and raise penalties on firms that exceed it. Introduce a mandatory minimum period of rest between periods of work.	Working hours decreased in 2019. The annual limit on overtime was implemented for small and medium-sized firms from 2020 as planned.
Focus on reducing the waiting list for childcare so that mothers are not forced to leave the workforce and strengthen measures to prevent discrimination against women in education and employment.	The government promotes the establishment of childcare facilities by enhancing available support including additional subsidies to regions with greater need. The government made a new plan in 2020 to further increase the number of childcare places by 140 thousand by March 2025 to facilitate higher female labour force participation.
Provide programmes to help foreign nationals adjust to Japan, including through education, and ensure fair treatment in wages and conditions to attract foreign workers.	Public Employment Service offices (Hello Work) and other agencies provide multi-lingual consultation services and advice to employers of foreign workers.

Improving business sector productivity

Raising productivity is key to address the pressures from ageing. Productivity growth has been muted in recent decades, but there is considerable divergence across sectors. Large enterprises in manufacturing can be very productive, but the service sector and smaller enterprises have struggled. As discussed in chapter 2, structural features such as weak entry of new firms, the lack of investment and shortages of skilled personnel can be important constraints on growth (Box 1.6). In particular, the entry of new firms is low by international comparison and investment in intangibles to make the best use of new technologies is lagging (Hosono, Takizawa and Yamanouchi, 2020[54]). Options to encourage greater firm entry include raising the wealth exemption in personal bankruptcy. However, as discussed in chapter 2, entrepreneurs face difficulties in gaining access to training and finance, particularly for digital and largely knowledge-based sectors.

Box 1.6. Quantification of the impact of structural reforms

Reforms proposed in the Survey are quantified where possible in the table below, based on empirical relationships between past structural reforms and productivity, employment and investment. These relationships allow the potential impact of structural reforms to be gauged. The effects are based on cross-country estimates, not necessarily reflecting the particular institutional settings of Japan. As such, these quantifications are illustrative.

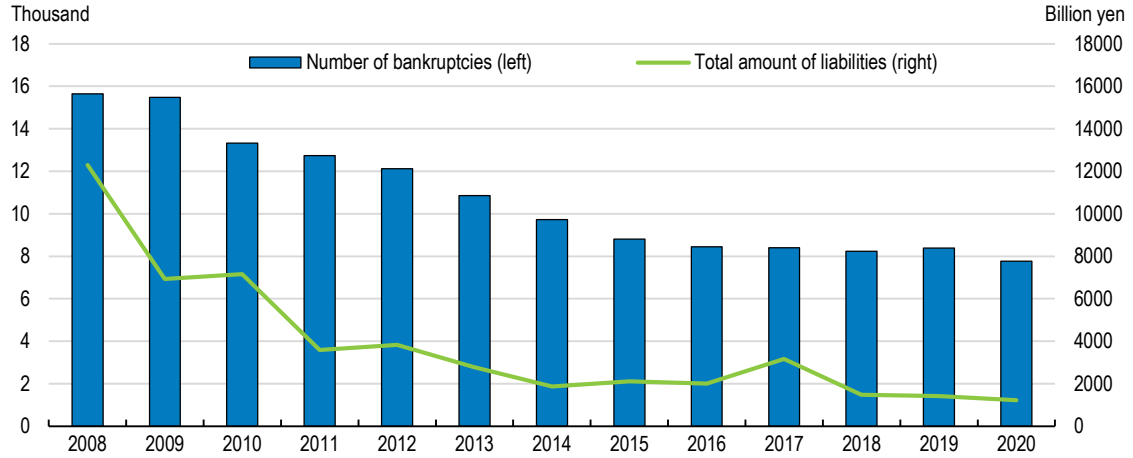
Table 1.11. Potential impact of structural reforms on per capita GDP

Reform	10-year effect	Long-run effect
Expand further the supply of high-quality childcare facilities	0.5%	0.6%
Raise spending on training in active labour market policies	0.7%	1.5%
Support R&D spending in young and innovative firms	0.2%	0.4%
Support for start-ups	0.6%	1.6%
Total	2.0%	4.1%

Note: The reforms are calibrated on the average size of reform observed in the OECD with the exception of support for start-ups which is the implied effect of reducing the OECD product market regulation scoring of administrative barriers to start-ups to the best practice in the OECD. The increase of in-kind social spending to support childcare provision is around 10% and would raise spending to around the OECD average. Active labour market spending per unemployed person would rise by around one-third and close to the OECD average per unemployed person. The rise on R&D spending is around 0.1% of GDP.
Source: OECD calculations based on (Égert and Gal, 2017[55]).

The emergency support to prevent widespread firm failure worked, leading to a marked slowdown in insolvency procedures. There were 7,773 corporate bankruptcies in 2020 – a record low (Figure 1.25). Around one tenth of bankruptcies were linked directly to the difficulties created by the pandemic with bankruptcy numbers in the hospitality sector bucking the aggregate trend and rising (Tokyo Shoko Research, 2021[56]). As the recovery gathers strength, policy needs to move away from loan guarantees, which as discussed above are already substantial, and avoid the perpetuation of a new wave of zombies (as discussed in chapter 2).

Figure 1.25. The number of bankruptcies has fallen



Source: Tokyo Shoko Research.

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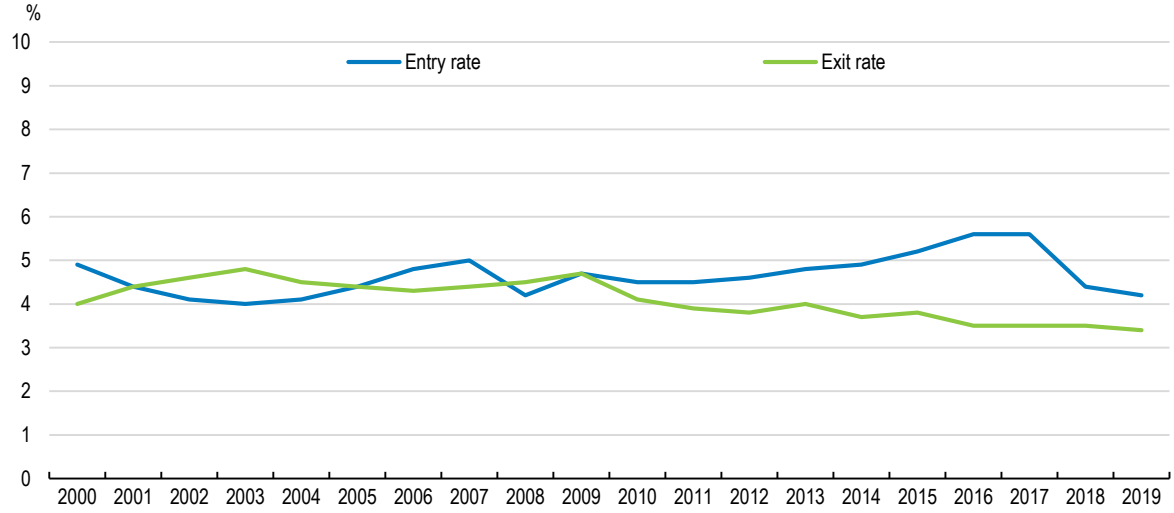
New firm entry has been weak and the pandemic is likely to have depressed entry as occurred across many other countries in the OECD, although not all (OECD, 2021[57]) (Figure 1.26). A number of countries have introduced packages to support new business formation in reaction to the pandemic, rather than to continue to prop up existing enterprises. This included early-stage equity and start-up support in Austria, Australia, Belgium, Germany, Hungary, Lithuania, the Netherlands, Sweden and the United States. The French *France Relance* plan introduced measures to support entrepreneurship in R&D and innovation. Other countries, such as Australia, France and New Zealand have supported businesses taking administration and regulatory processes online or boosting digital skills amongst smaller enterprises. As discussed in chapter 2, encouraging the merger, acquisition or divestiture of viable small enterprises may help avoid the zombie firm problem by consolidating these firms and making best use of available managerial talent.

Competition is one means of spurring productivity growth. The OECD measures of product market regulation suggest that government regulation in Japan distorts competition somewhat more than average in the OECD (Figure 1.27). In comparison with other countries, government involvement in the economy is more pronounced, particularly with respect to public procurement where a level playing field is not guaranteed. There are also potential improvements in reducing the complexity of regulation and establishing rules on how government interacts with interest groups to ensure the regulatory process is robust to lobbying activities. In the network sectors, regulation is amongst the best in the world for rail and near the average for the energy utilities. However, the regulatory environment for e-communications is less friendly to competition. Government (indirect) ownership and the lack of secondary trading for spectrum are shortcomings in relation to OECD best practice as is the lack of clarity about number portability and roaming charges.

The government has made progress in reducing barriers to international trade and promoting trade facilitation. In late 2020, the Regional Comprehensive Economic Partnership Agreement was signed by 15 countries. The agreement aims to reduce tariffs on goods over the next 20 years and liberalise trade in services. With respect to trade in services, Japan's regulatory environment is already quite open, although competition appears relatively more restrictive for legal services. Overall, Japan's regulatory environment could be even more competition friendly by relaxing the requirement for a foreign services provider to have a local presence, which requires a company to be registered in Japan, and the ban on unskilled labour by temporary services suppliers (OECD, 2021[58]). The Regional Comprehensive Economic Partnership also made progress in trade facilitation, easing the rules of origin restrictions and customs procedures that previously hindered the movement of goods between signatories. Estimates suggest that this agreement

will raise real incomes in Japan by 1% by 2030, an impact similar in size to that expected from the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (Petri and Plummer, 2020[59]).

Figure 1.26. Business dynamism has remained weak

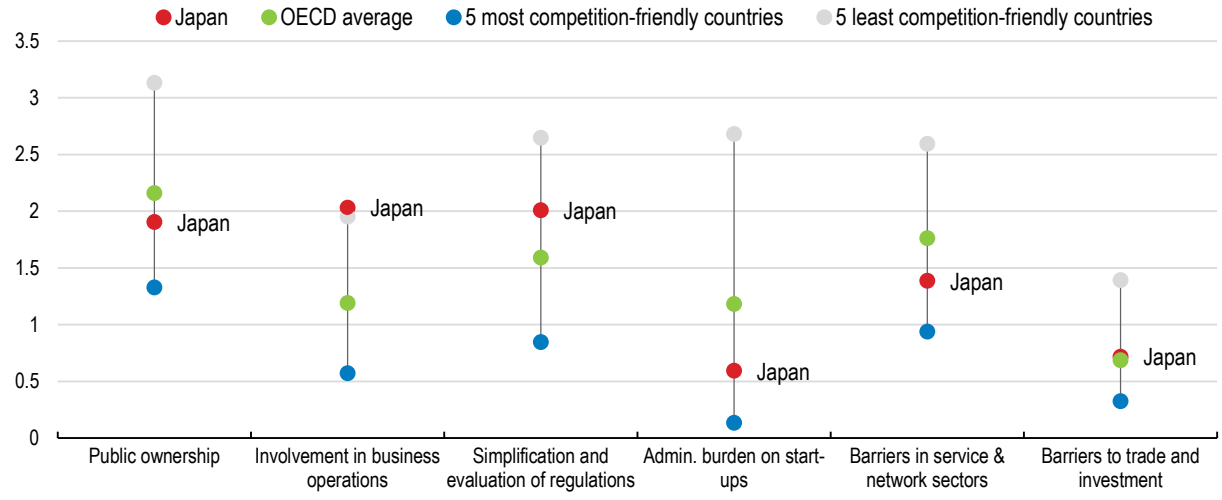


Note: The rates are calculated as the number of firms joining or leaving employment insurance.
Source: Ministry of Economy, Trade and Industry.

StatLink https://stat.link/fcex0j

Figure 1.27. Regulation is relatively complex and the state is involved in business operations

Index scale 0 to 6 most to least competition-friendly regulation, 2018



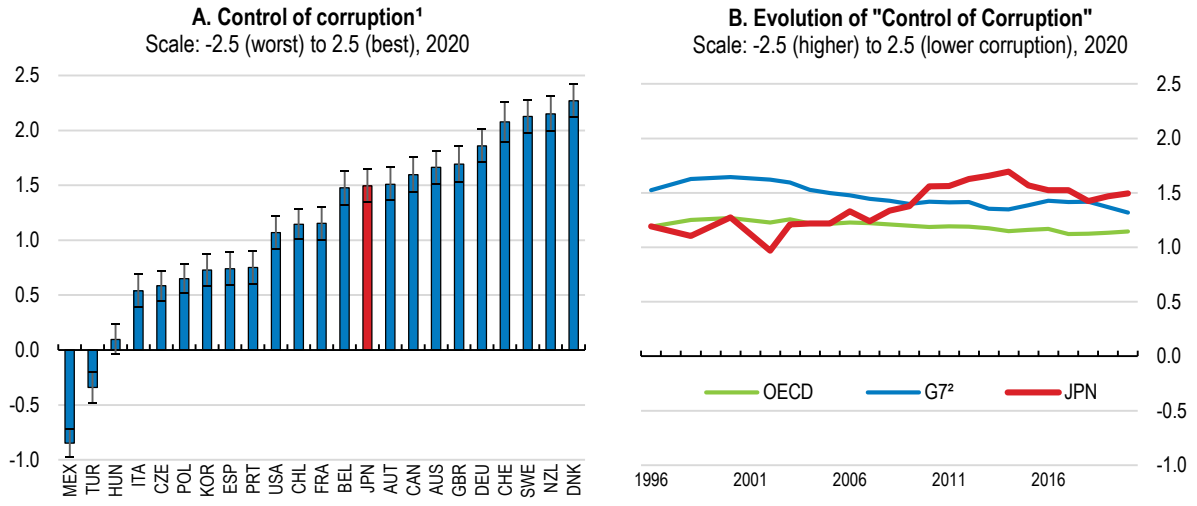
Source: OECD Product Market Regulation Database.

StatLink https://stat.link/l1bv6g

Countering corruption

Corruption hinders growth and economic development. It weakens institutions and distorts competition, thereby impeding effective resource allocation and discouraging business dynamism, investment and innovation. In addition, corruption can aggravate inequality when it limits equal access to public goods. Overall, levels of perceived corruption are close to those observed in other G7 countries (Figure 1.28).

Figure 1.28. Levels of perceived corruption are relatively low



1. Panel A shows the point estimate and the margin of error. For more details on the construction of this synthetic indicator, see Jin, Y. (2021), "Framework to discuss corruption in OECD Economic Surveys", OECD Economics Department Working Papers, No. 1666.
2. Excluding Japan.
Source: World Bank, Worldwide Governance Indicators.

StatLink https://stat.link/zwun65

The government has taken several initiatives to strengthen the control of corruption but some forms of illicit conduct, especially in the interaction of public officials with the corporate sector, have proven difficult to eradicate. Parachuting retiring government officials into lucrative jobs within the companies they used to regulate (*amakudari)*, notwithstanding restrictive amendments to the National Public Service Act, introduced in 2007, is still relatively common, as revealed by a government-wide review of the phenomenon, following scandals involving several senior ministry officers (Reemployment Surveillance Committee, 2017[60]).

Similarly, in the context of public procurement, it is not uncommon for bidders to hire former public officials from the government agencies administering the tenders. This heightens the risk of bid-rigging incidents (*kansei dango*). Such forms of collusive behaviour risk crowding out competitive firms and lowering the quality of public investment, while raising fiscal costs. Growing anti-corruption awareness in recent years, though, has led Japanese firms, especially medium- and larger-sized ones, to strengthen their commitment to corporate social responsibility and to adopt tighter codes of conduct in business transactions. Moreover, participation in bid-rigging schemes exposes corporate executives to the risk of being sued by shareholders, as the latter are increasingly ready to take quick action to limit ensuing damage to their companies' reputation (Xu, Palmer and Park, 2021[61]).

Transparency in public procurement has been strengthened in recent years. The government's move to improve a single electronic portal providing access to the procurement notices of all relevant authorities (to the extent the former are covered by WTO rules and Japan's Economic Partnership Agreements with the European Union and the United Kingdom), helped support competition by foreign companies (EC, 2020[62]). At the height of the COVID-19 crisis, the Ministry of Economy, Trade and Industry (METI) introduced new rules ensuring greater disclosure of dealings with bidding companies, while extending transparency requirements to involved subcontracting networks and fostering external audit. These measures were aimed at enabling full transparency of METI's spending, particularly the disbursement of COVID-related subsidies to struggling businesses, and avoiding the latter could be shielded from public scrutiny through the use of multiple layers of subcontracting. At a more decentralised level, in 2017, Tokyo's Metropolitan Government in the context of the 2020 Olympic venues' construction projects, ruled

that tenders attracting only one bidder should be cancelled (Nikkei, 2018[63]). However, the number of cancelled contracts doubled and the measure was revoked, raising the risk of favouring incumbents and limiting competition, especially at a local level (GAN, 2020[64]) .

Implementation of the OECD Anti-Bribery Convention has improved but there is scope to enhance the enforcement of foreign bribery cases. Recently, Japan enabled authorities to confiscate the proceeds of foreign bribery acts and criminalised their laundering. In addition, a new agreement procedure, introduced in 2018, encouraged the co-operation of individuals with first-hand knowledge of illicit conduct resulting in foreign bribery acts, which should help raise the effectiveness of prosecution. The capacity of law enforcement agencies to quickly detect and investigate foreign bribery offences, though, remains rather limited while whistleblower incentives to come forward are relatively weak (OECD, 2019[65]) . In a welcome move, the latest revisions to the Whistleblower Protection Act, in June 2020, extended its application to the recently retired, while imposing on firms the obligation to set up proper systems to handle whistleblower reports and protect their anonymity. Even so, the new rules failed to introduce any criminal or administrative penalty for firms retaliating against whistleblowers. Higher penalties for retaliation, as well as the establishment of specific reward programmes, would likely encourage disclosure initiatives – especially considering that employees wrongfully fired for whistleblowing are currently only entitled to reinstatement. Extending the limitations period for prosecution and the adoption of leniency-type schemes, aimed at generating firms and individuals' cooperative behaviour in exchange for reduced fines, would provide additional support towards a more effective enforcement of foreign bribery laws in Japan.

Table 1.12. Past OECD recommendations on raising productivity

Past recommendations	Actions taken
Carefully monitor the implementation of the principles in the corporate governance codes to encourage firms to use large cash holdings for investment, increase diversity on corporate boards and reduce cross-shareholding.	The corporate governance codes were revised in 2021 to enhance diversity of management (by setting targets and requiring information disclosure) and diversity and quality of corporate boards (by for example increasing the numbers of independent directors for companies listed in the top category of the stock market).
Encourage mergers, acquisitions and divestitures of SMEs in the face of labour shortages to promote consolidation of managerial resources in viable firms.	The government has acted to support SMEs granting subsidies to encourage inheritance and also encouraging mergers and acquisitions.

Key policy insights recommendations

MAIN FINDINGS	RECOMMENDATIONS (key recommendations in bold)
Getting beyond the pandemic	
Even though infection rates are small by international comparison, several waves of infections have put pressure on the health sector.	**Continue to roll out vaccinations and support the health sector's ability to react to infections.**
The economy is gradually recovering but remains weak and is exposed to further shocks. Government emergency support has made extensive use of loan guarantees in supporting firms.	**Continue to restructure support towards demand-supporting structural reforms that will benefit the economy in the longer run.** Unwind lending schemes as the sanitary situation improves and shift support to equity-based financing.
Inflation has veered down before picking up again, but continues to run under target. Against the backdrop of a long period of low interest rates and demographic change, some financial risks have emerged, including in relation to foreign currency funding and regional banks. Regional banks have struggled in recent years as ageing has become more pronounced in rural areas	**While inflation remains below target, maintain the current accommodative monetary policy stance to support economic recovery.** **Financial supervisors need to remain vigilant with regard to liquidity and funding risks.** Continue to support regional banks to strengthen their business foundations.
Securing long-term fiscal sustainability	
Gross debt stands at unprecedented levels. Without corrective action, fiscal policy is unsustainable in the long run.	**Elaborate a roadmap to realise a primary surplus in a comprehensive plan to achieve longer-term sustainability.** **Once the economy has recovered, gradually raise revenues, including by increasing the consumption tax rate further by small increments on a more regular basis.** Pursue opportunities to improve public spending efficiency, including through the greater use of digital technologies.
Securing long-term environmental sustainability	
Climate change objectives are challenging and will require major investment and public support in developing technologies that can contribute to emission reduction or carbon capture and storage. Initiatives are being trialled in a large number of areas. Some of the proposed possible emission reductions are not yet cost effective.	**Elaborate an emission reduction plan with a concrete and feasible timetable, including for the investments needed to adjust the energy mix and meet the zero net emission target.** Make sure different parts of a package do not move too far out of line to minimise abatement costs. **Make greater use of market-based instruments, such as the carbon tax, a trading system or carbon credit market, while taking into account the social and economic impact, as part of a wider strategy that also includes investment and regulation.** Gradually increase the effective carbon price by raising and broadening the base of the carbon tax hike and/or introducing an emission trading scheme. Address the social and economic impact of climate change policy through temporary compensation packages for the most vulnerable.
The energy system remains highly fragmented, which limits the options for expanding the contribution of renewables to electricity supply.	**Invest in more interconnector capacity and ensure regional electricity grids support an increase of renewable electricity supply.**
Boosting productivity and labour supply	
Demographic pressures will weigh on the outlook, reducing the inflow of new workers. Labour market reforms had been boosting participation and employment of the elderly, women and from immigration, but the pandemic has led to job losses. Digitalisation will call for new skills, which older and low-skilled workers need support in acquiring.	**Act to strengthen labour supply further.** **Continue *Work Style* reforms including equal pay for equal work and flexible working arrangements with improving child-care provision to boost female labour force participation.** **Continue to raise the compulsory retirement age or abolish it.** Build on current immigration policies to increase labour supply. Expand coverage of employee's pension and health insurance and reduce disincentives for second earners. Enhance job-training schemes especially for the low-skilled and those with limited access to firm-based training.
Productivity growth has been lacklustre overall. Business dynamism is weak with relatively few start-ups and exits of low-productivity (often smaller) firms. Investment in ICT and complementary intangible assets has been largely concentrated in larger enterprises.	**Increase targeted spending on R&D, investment and education and training to boost productivity growth.** Increase the wealth exemption from personal bankruptcy to promote exit and entry. **Encourage mergers, acquisitions and divestitures of SMEs in the face of labour shortages to promote consolidation of managerial resources in viable firms.** **Expand access to entrepreneurial training and finance, in particular for women**.

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2 Making the most of digitalisation following COVID-19

New digital technologies and big data have created opportunities to address persistently sluggish productivity growth and mitigate the effect of an ageing and shrinking population on the economy amongst other challenges. The Japanese government has embarked on an ambitious plan of digital transformation and businesses are often at the forefront of new technologies. The pandemic accelerated the digital transformation as households, businesses and government switched to new technologies and ways of organising themselves in order to minimise health risks. But the pandemic also exposed shortcomings. Many were underprepared having not made needed investments to exploit these new technologies. While government is pursuing initiatives across a number of areas, weaknesses in linking databases hindered its ability to target support for those most affected by the pandemic. Investment by business is concentrated in larger firms and the dynamism offered by new firms entering the market is limited. Students and workers, while highly trained, can lack the skills needed to exploit fully new digital tools.

The impact of the pandemic on the ongoing digital transformation

In 2016, the Japanese government set out a vision for the future society named Society 5.0, meaning "a human-centred society that balances economic advancement with the resolution of social problems by a system that highly integrates cyberspace and physical space". Harnessing digitalisation's potential is a core part of the Society 5.0 initiative. Society 5.0 is seen as a means to achieve sustainable economic development by addressing social issues, low productivity, an ageing society, and energy and climate problems with digital technologies and innovations. This approach emphasises organisational changes to leverage what is already happening at the micro level, such as smart city or smart medicine, and roll them out across the economy and country.

One of the impacts of the pandemic has been to accelerate Japan's ongoing digital transformation and organisational changes, for example in the way that public services are provided or how firms outsource tasks to third-party providers. However, the difficulties that firms and households faced during the pandemic also highlighted weaknesses. For example, the shift to remote working was hindered by work practices and poor telecommunication infrastructure in some homes. Indeed, over one-third of respondents in one survey felt their productivity had declined due to a poor telecommunication environment at home (Morikawa, 2021[1]). Household interactions with government required physical presence in some areas of the country, whereas in others all such services were already available remotely (Box 2.1).

In many respects, Japanese firms and households are well placed to benefit from greater digitalisation. The communications infrastructure is well developed and the skills of the population are elevated by international comparison. Companies are at the forefront of certain technology areas and investment in research and development is high. Japanese students and adults perform well in international rankings of skills and the population is increasingly educated (OECD, 2019[2]), (OECD, 2019[3]).

However, the availability of skills and technologies is not sufficient to guarantee success in a competitive environment. The full benefits require complementary investments and redirection of some efforts. Using new technologies effectively often requires changing the way firms and organisations work and the acquisition of new skills to use these new technologies. This places demands on decision makers, both in the public and private sector, to adapt. The population also can seize new opportunities, making the economy more nimble in reacting to changes.

Against this background, this chapter first assesses the existing conditions for the digital transformation. The role of government is central to making progress, both in its own use of digital technologies and through facilitating the digital transformation by firms and the population. The business sector has much to gain against a backdrop of weak productivity growth and an ageing workforce. The next section discusses how the business sector is adapting to the digital transformation and the key bottlenecks to further development. Digitalisation could give a needed boost of dynamism, but much depends on adequate investment in ICT technology and the organisational capacity and skills. The final section addresses how the flow and stock of skills need to adapt to greater digitalisation.

Box 2.1. Digital information and technology during the pandemic

The pandemic and the measures taken to cope with it suddenly altered economic agents' behaviour. Some of the main traditional measures of economic activity turned out to no longer be informative or timely enough. Non-traditional sources of data, such as internet search requests, mobility tracking from mobile phones and banking card activity became important means of monitoring the state of the economy, the impact of containment measures and individuals' proximity to COVID-19 carriers.

Digital technologies were mobilised to mitigate transmission risks during the pandemic. For example, a baseball match in Yokohama in November 2020 tested whether crowds could congregate safely as

preparation for the Olympics and Paralympics in 2021. New technology used monitoring devices within the stadium and a smartphone application to inform spectators about congestion in different parts of the stadium.

The pandemic accelerated reforms already happening in some enterprises and government agencies. To reduce exposure to the coronavirus, teleworking was extended. This also led managers to rethink how to organise their work. In some cases, face-to-face interactions could be replaced by virtual interfaces or robots. Like in other countries, the pandemic boosted the number of firms using digital payment platforms and increased the public's acceptance of digital settlement. In comparison with 2019, online purchases rose by 11% on average in 2020, and by almost 20% in major cities. This is an important change in Japan, where so far cash dominated consumer purchases (cashless payments' share of total transactions was only 20% in 2016, compared with over 50% in the euro area and over 70% in the United States (Esselink and Hernández, 2017[4]) (Kumur and O'Brien, 2019[5]).

After the initial lockdowns implemented across the OECD, subsequent measures have had smaller economic impacts, as businesses and households adapted to the restrictions, often by making greater use of digital technologies. Overall, digitalisation has contributed to economic resilience by allowing greater flexibility in working arrangements and reducing the need for face-to-face interactions at the point of sale. This helps not only in the face of a pandemic but also to cope with natural disasters.

Where does Japan stand with respect to digitalisation?

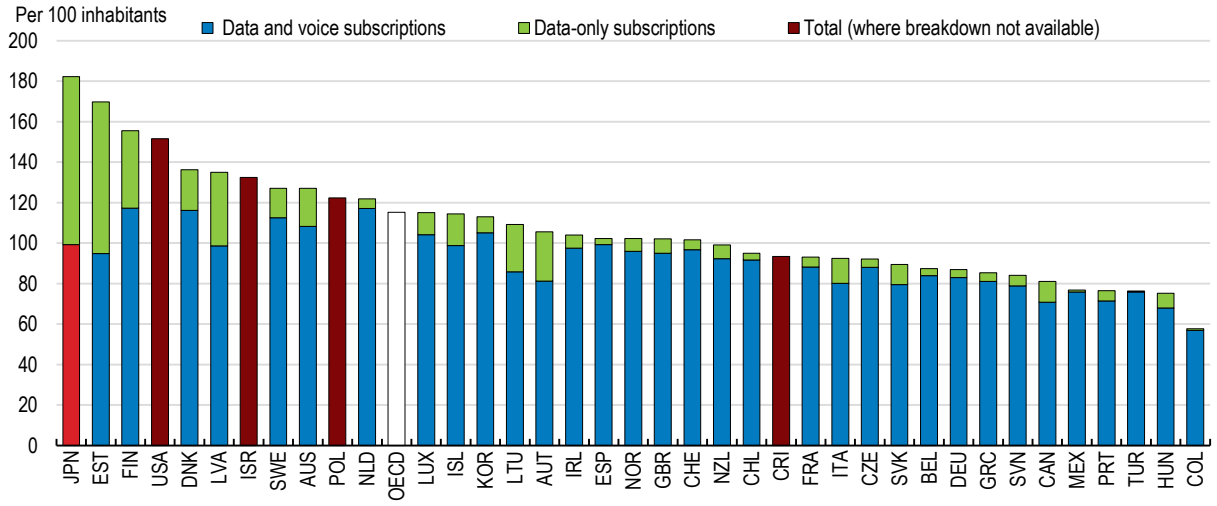
Communication infrastructure and internet usage

Japan performs well on a number of communication infrastructure indicators. For example, the overall number of people with access to broadband is high. This is especially true for the number of mobile broadband subscriptions per 100 inhabitants, which is the highest in the OECD (Figure 2.1). Major telecom companies have already begun to roll out 5G technologies. In contrast, fixed broadband subscriptions are around the OECD average at 32 per 100 residents (OECD, 2020[6]), even though the share of future-proof fibre in fixed broadband subscriptions ranks amongst the highest in the OECD (Figure 2.2). The share of firms with broadband connections was around the OECD average in 2019, and the share for companies with over 250 employees was the lowest in the OECD.

The use of communication services, however, lags behind the high number of broadband subscriptions. Before the pandemic, the share of the population using the internet for online commerce was around the OECD average (Figure 2.3). In 2019, mobile data usage was below the OECD average, notwithstanding the high subscription rate. Education's use of ICT technologies also appears relatively weak. The share of individuals attending an online course was below the OECD average, at 9.4% against 13.6 in 2019. Finally, the share of individuals using e-government services has been amongst the lowest in the OECD. In 2019, just 7.9% of the population have used the internet to fill in forms via the public authorities' websites (the unweighted OECD average was over 40% of 16 to 74-year olds). However, the coronavirus pandemic resulted in a number of changes. Communication operators noted marked increases in mobile data usage, partly also driven by new pricing plans for broadband that reduced costs dramatically. Education also switched to distance learning wherever feasible and government has been pushing for greater digitalisation of its services.

Figure 2.1. Access to mobile broadband is widespread

Mobile broadband subscriptions per 100 inhabitants, by technology, June 2020



Source: OECD, Broadband database.

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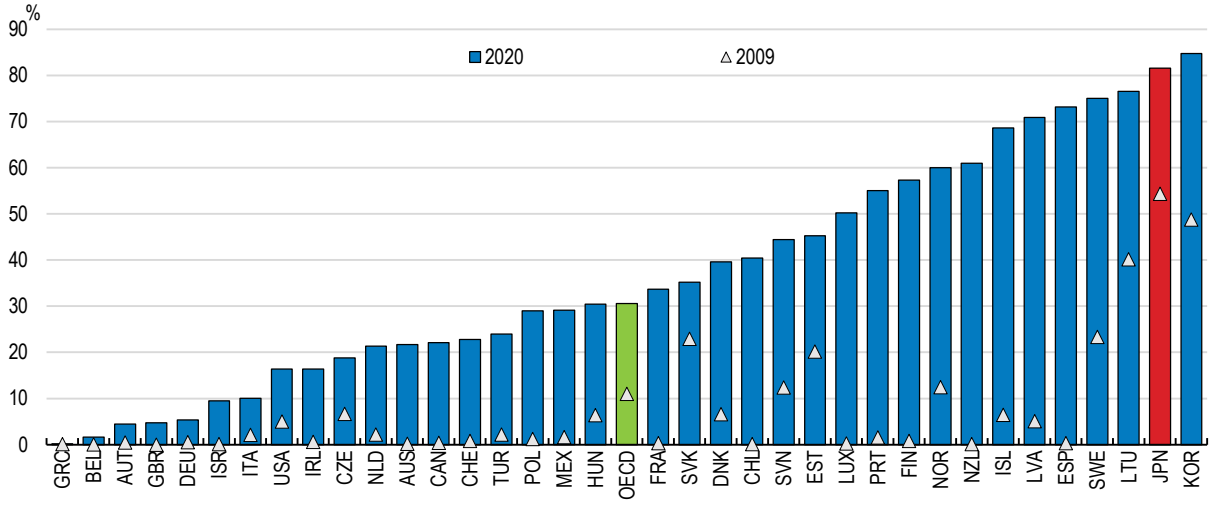
Figure 2.2. Most connections are high-speed broadband

Percentage of fibre connections in total fixed broadband



Note: 2010 rather than 2009 for Canada, Turkey and United Kingdom.
Source: OECD Broadband database.

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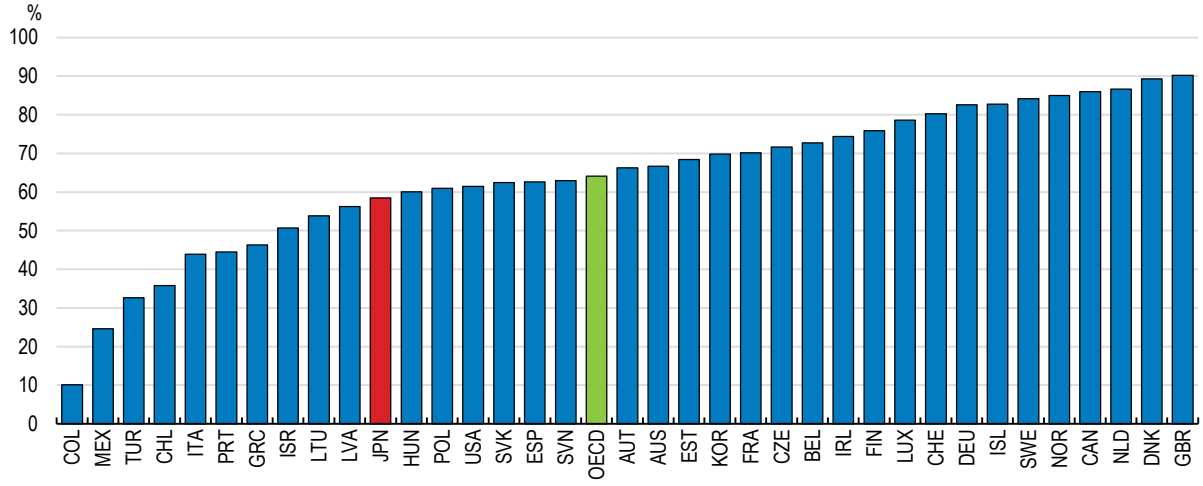
Japanese businesses are at the digitalisation frontier in many ways. The use of robots in manufacturing is third only to that of Korea and Singapore, with the number of robots per 10000 workers estimated to be 364 in 2019. Furthermore, Japan accounts for 47% of global robot production (IFR, 2021[7]). In this respect, Japanese manufacturers have maintained their lead over the United States and Europe (Dekle, 2020[8]). The automotive industry makes extensive use of welding robots while precision manufacturing, such as electronics, makes more use of assembling robots. These two sectors account for around two-thirds of all

robots in use in Japan. Japan is also an important player in digital technologies development, accounting for a sizeable share of the patents in emerging digital technologies (Figure 2.4). Firms are amongst the leaders in the OECD in using cloud computing, which is more prevalent amongst larger firms and with the gap to smaller firms growing over time (Figure 2.5). On the other hand, radio-frequency identification, which collects data remotely throughout the production process, is comparatively less developed.

Figure 2.3. Online purchasing is around the OECD average

Share of individuals participating in e-commerce, 2020 or latest available year



Note: Data refer to 2019 for Columbia, France, Japan, Israel, Switzerland, and United States, 2017 for Chile, and 2016 for Australia.
Source: OECD ICT Access and Usage by Individuals database.

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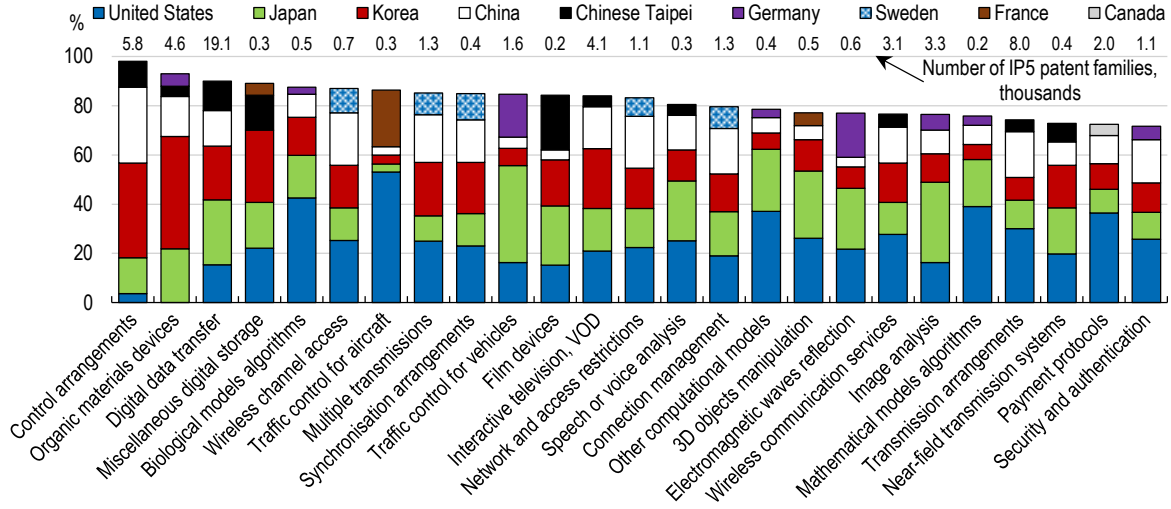
Figure 2.4. Japan is an important developer of emerging digital technologies

Share of top five economies' patents in top 25 technologies fast accelerating from 2010 onwards, 2013-16



Note: IP5 denotes the five largest intellectual property offices worldwide (European Patent Office, Japan Patent Office, Korean Intellectual Property Office, National Intellectual Property Administration of People's Republic of China and United States Patent and Trademark Office). Fast-accelerating ICT fields are defined as technology fields where substantial increases in the number of patents are observed.
Source: OECD (2019b), calculations based on STI Micro-data Lab: Intellectual Property Database.

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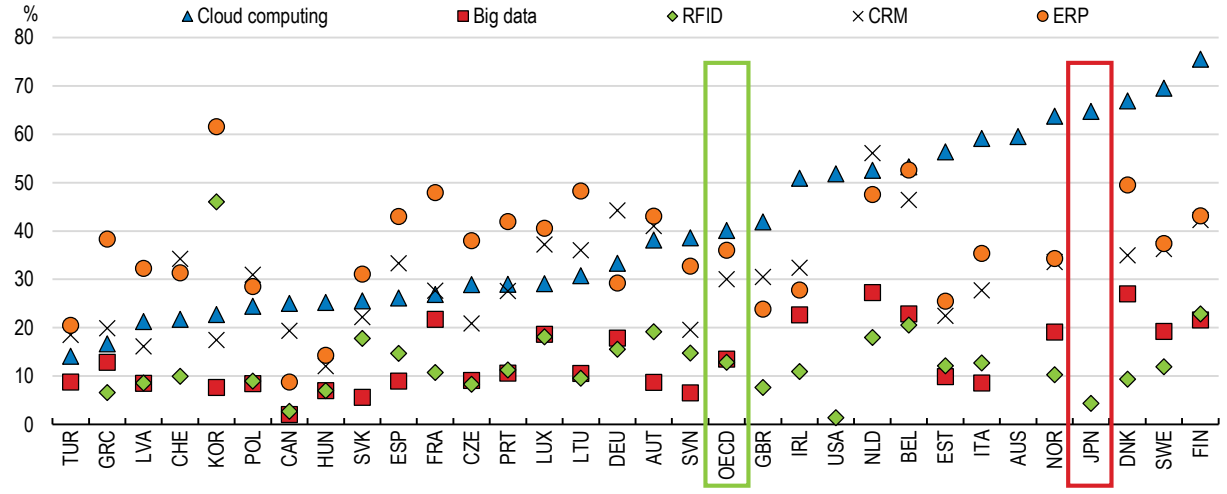
Figure 2.5. Some digital technologies are widely used

As a percentage of enterprises with ten or more employees, 2020 or latest year



Note: RFID stands for Radio frequency identification; CRM for Customer relationship management; ERP for Enterprise resource planning. Data for cloud computing refer to 2020, except for Canada, Japan (2019) Australia, Korea, United Kingdom (2018) Switzerland and United States (2017). Data for big data refer to 2020, except for Canada (2019) and Korea (2018). Data for RFID refer to 2017 except for Canada, Japan and Korea (2019). Data for CRM refer to 2019, except for Switzerland and Iceland (2017). Data for ERP refer to 2019, except for Switzerland and Iceland (2017). The statistical unit for Korea is the establishment and not the enterprise and covers public and private sectors. The scope of coverage for Japan extends to the firms that have 100 or more employees, while for Australia, Korea and New Zealand all enterprises are included.
Source: OECD ICT Access and Usage by Businesses database.

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The backbone of past high growth has been manufacturing, particularly machine tools, automotive products and steel. As economies are changing and the service sector becomes increasingly important, the drivers of productivity growth are also changing. Greater use of digital technologies creates new opportunities, both in manufacturing and elsewhere. For example, the rollout of 5G telecommunication networks facilitates the transmission of large data volumes at far higher speed, with low latency and hyper-connectivity. Applications using these attributes stretch from the smart cities local governments are already exploring, e-health, autonomous vehicles, the internet of things, smart grids and factories. This will introduce new goods and services - and by integrating machine learning and artificial intelligence techniques - make production more reactive to changes in demand and supply as well as potentially lifting productivity. In this regard, the digital transformation will support productivity and make the economy more resilient to shocks. Central to the digital transformation is investment in new technologies and the diffusion of knowledge.

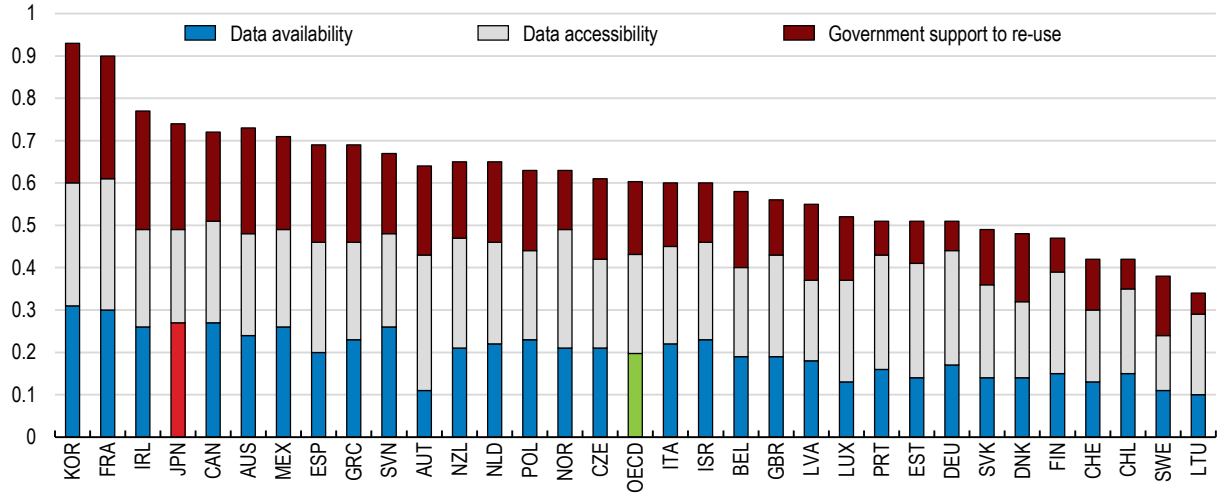
Promoting the government's role in the digital transformation

Governmental digital transformation: capacities and challenges

Japan is relatively advanced in e-government, especially with respect to infrastructure. The Japanese government has made efforts to make its data more open and to promote their reuse by the public and private sectors. According to the OECD Open, Useful and Re-usable data (OURdata) index the country ranks highly in terms of the design and implementation of open data policies (Figure 2.6).

Figure 2.6. Government policy settings for data provision appear relatively good

Open Useful and Re-usable data index (2019)



Note: Data for 2019 are not available for Hungary, Iceland, Turkey and the United States. Data availability assess formal requirements to promote open government data. Data accessibility assesses policies to promote unrestricted access to understandable data, ensuring data quality and implementation of these requirements once data are published. Government support to re-use measures how proactive governments are in promoting the re-use of data within and outside government.
Source: OECD OURdata Index 2019.

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However, the digital services provided by the government are not fully utilized, though with variations across levels of government. The use of the internet to interact with the public sector is not very common in comparison to other OECD countries (Figure 2.7). A Cabinet Secretariat and Ministry of Internal Affairs and Communications survey conducted in 2020 on the use of online administrative procedures found that the major central government services for the private sector were relatively well digitised with an online application rate of 50.6% (Table 2.1). However, the procedures of local governments are less well digitised and heterogeneous across areas. The survey also found that the main private sector users of government online services were firms, while individuals were much less likely to use online applications. This also would reflect on the relevance of adopting people-driven approaches towards understanding the needs of citizens and embedding these into the design and delivery of digitally-enabled public services (OECD, 2020[9]).

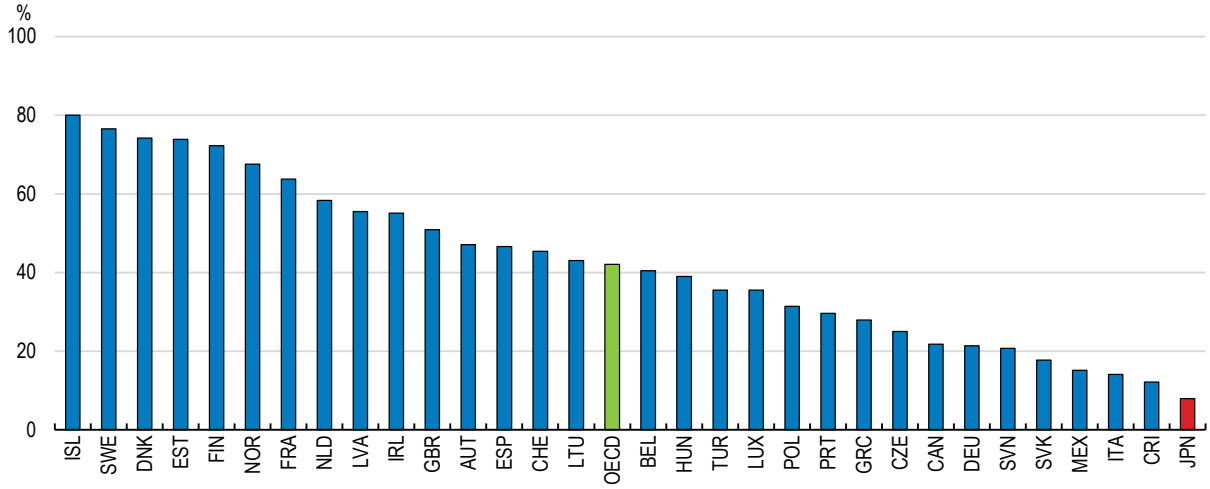
Table 2.1. Administrative procedures and applications

Applicant to receiver	Total number of procedures	Number of online procedures	Total number of applications (millions)	Number of online applications (millions)	Online application ratio (%)
Total procedures	62,253	6,467	2,565	1,067	41.6%
Private sector to central government	18,336	3,247	1,004	508	50.6%
(including for citizens)	(3,016)	(407)	(76)	(3)	(3.9%)
Private sector to local governments	6,537	307*	390	6.6	1.7%
(including for citizens)	(1,287)	(85)	(249)	(0.1)	(0.0%)

Note: Online application ratio calculated by the number of applications.* 165 of 307 procedures could not be done online by municipalities or local branches. Some online applications were not reported in the research because of difficulty to count by individual local entities.
Source: (Cabinet Secretariat and Ministry of Internal Affairs and Communications, 2021[10]) and OECD calculation.

Figure 2.7. Internet use for public services is limited in Japan

Individuals using the Internet for sending filled forms via public authorities' websites, 2019 or latest



Note: As a percentage of individuals in age 16-74 or 75.The data for Canada and Costa Rica refer to 2018. Different methodologies are used in EU and non-EU countries. For example, there are differences in the format of the questions. In addition, the sample for Japan covers individuals aged 15-74, while the sample for majority of the countries refers to those aged between 16 and 74.
Source: OECD, ICT Access and Usage by Households and Individuals database.

StatLink https://stat.link/b8y9tk

The pandemic highlighted some e-government shortcomings. The lack of linked information in different government databases affected the government's ability to support individuals and households. For example, online procedures occasionally took longer than paper ones to organise the cash handouts of JPY100,000 to every resident in some municipalities. This arose because local governments during the state of emergency had insufficient administrative capacity and lacked the necessary database for the online processing needed with the national personal ID (My Number) to connect personal information during the pandemic. As a result, local government officials had to check the consistency manually. It took around three months to deliver the benefit to over 90% of households. Moreover, local governments could not easily determine household income, which led to delays in getting support to low-income households affected by the pandemic. This contrasts with the experience in Estonia for example, where 99% of administrative procedures are digitised, which enabled the authorities to provide a one-off benefit within about a fortnight. Ultimately, efficient public sector digital arrangements make it possible to provide services to the public much more quickly and to target them as needed, without any overwhelming pressures on the public sector during periods of stress, such as in a pandemic.

Digital transformation and innovation in public service delivery

The digital transformation of government can achieve several objectives. First, it can improve the efficiency of administrative processes. For example, individuals do not need to provide their personal information repeatedly. When databases are interconnected and accessible to different government departments and across levels of government the administrative burden associated with moving can be reduced. In addition, inefficient processes can be eliminated. For example, the use of *hanko* (stamps) on physical documents often serves no practical purpose and increases transaction costs. Almost all of the uses of *hanko* could be replaced. Indeed, the city of Fukuoka systematically reassessed the use of *hanko* in their procedures and eliminated around 3 800 of them. These administrative procedures could then be conducted online or even in convenience stores. During the pandemic this reduced the need for face-to-face interactions. The central government has also made a strong push to eliminate *hanko* and more generally for regulatory reforms to encourage more effective use of digital technologies.

Digital transformation can also raise productivity in the public sector, especially against a backdrop of an ageing and declining population, and contribute to improving conditions in the private sector. In the construction sector, the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) aims to achieve by 2022 an infrastructure and transport database and platform, with the resulting "Digital twins" providing a means to raise productivity, enhance the provision of operating information and promote research and development by helping co-ordinate industry, academia and government. In addition, the MLIT is promoting "i-Construction", which uses ICT technologies throughout the construction process: survey, measurement, design, construction, inspection and maintenance. Digitalisation also facilitates inspection of different types of infrastructure assets, such as by using drones (e.g. for checking structural integrity of otherwise hard to access locations) or robots (e.g. in-water or in zones undergoing natural disasters), with the identification of emerging issues helped by machine learning and artificial intelligence. These new methods allow cheaper more regular checking, potentially identifying when repairs and maintenance are needed and so reducing the need for investment in replacements. In addition, automated remote-controlled construction machines using 5G technologies (high precision real-time control based on global positioning satellites) reduce labour intensity and improve safety in construction sites. In 2016, the Japanese government set a target to improve productivity at construction sites by around 20% by 2025. In the construction sites under the direct control of MLIT, i-Construction reduced the total time of civil engineering ICT earthworks by around 30% in 2018 (MLIT, 2020[11]).

Smooth and efficient transportation can also improve productivity. In the port sector, Japan is building a data platform that enables port operators to conduct vehicle logistic procedures digitally. At present, the trials are relatively limited in coverage (notably the port of Yokohama use of the "Container Fast Pass" or "CONPAS"). These types of systems are already well developed in some other countries. For example, the Port of Freemantle in Australia uses a vehicle booking system, OneStop, that manages the available slots for containers through the day using a compulsory app (Productivity Commission, 2020[12]). The Freemantle port also uses a fully automated IT system to manage vessel congestion. Australian ports have rolled out driverless vehicles for moving containers around their ports. Against this background, digitalising port logistics, administration and use of infrastructure and integrating data more effectively will help improve port productivity and strengthen their international competitiveness.

For vehicle transport, mobility as a service, such as on-demand ride sharing applications, has been developed in some local areas in Japan. With the support of the government, such as the Smart Mobility Challenge Project, local governments are developing "Mobility-as-a-Service" initiatives that often harness digitalisation. For example, in Shiojiri an on-demand bus service (without predetermined routes or schedules) uses artificial intelligence to estimate the most efficient routes for buses. The city is also planning to trial driverless vehicles for some urban routes to address shortages of drivers. As the city's population is relatively elderly, passengers are often dependent on bus services for mobility. Digitalisation has also helped rural areas experiencing population declines exploit big data to predict demand and rationalise their provision of public transport (OECD, 2016[13]). At the same time, automated driving is currently being tested with a view to widespread practical use on highways by 2025. Following the revision of the Road Transport Vehicle Act in 2019, a Japanese car with level 3 autonomy (automated driving in special situations with support by a driver if necessary) received authorisation in November 2020 (MLIT, 2020[14]) and came onto the market in March 2021. The autonomous car market will develop through technology development and commercialisation, but also regulatory reform.

Regional revitalisation strategies and the Abe government's structural reform agenda aimed to improve productivity in rural areas. The Ministry of Agriculture, Forestry and Fisheries (MAFF) plans to digitalise all administrative procedures under its purview (over 3 000) by 2022 and to promote data aggregation including on climate, farmland, cultivated crops and geographical information on a data platform. Combining these data will make them more easily useable and support the development of "smart agriculture", with the aim of improving productivity and efficient use of land and other natural resources. There is also potential to boost productivity in the forestry sector. Around two-thirds of all land is forest in Japan, although much is

in mountainous regions. Innovations in forestry using automation (such as automated logging and transportation) and ICT technologies ("smart forestry") can cut administrative costs and improve felling productivity while improving safety.

The digital transformation of health care

With an ageing and shrinking population, improving labour productivity in social security and medical and long-term care is key to limit pressure on budgets. Digitalisation and AI technology potentially offer benefits by improving the quality and efficiency of such services. Big data analysis of personal health and medical data will be useful for the effective prevention of diseases and adjusting health and long-term care services to meet the needs of the population. This could help reduce the observed high rate of unnecessary treatments, procedures and therapies. In this context, better use of timely and high-quality data could improve public sector cost efficiency (OECD, 2019[15]). This calls for investing in capacities and governance frameworks for enhanced access to and sharing of data in the public sector (OECD, 2019[16]), as well as adopting principles and frameworks to govern their use (OECD, 2021[17]). Furthermore, digital devices, such as real-time health check sensors and care robots, as well as tele-medicine can improve productivity while reducing pressure on health care workers, by allowing them to concentrate on where their interventions are most needed. For example, care robots in nursing homes make for shorter and more flexible working hours for staff, and reduce the psychological burden they bear (Eggleston, Lee and Iizuka, 2021[18]). Expanding the use of these approaches, however, requires the acceptance of the medical staff and the public. The Japanese government has set a (conservative) target to improve productivity per hour by more than 5% by 2040 through the introduction and use of robots, ICT equipment and health data (MHLW, 2019[19]).

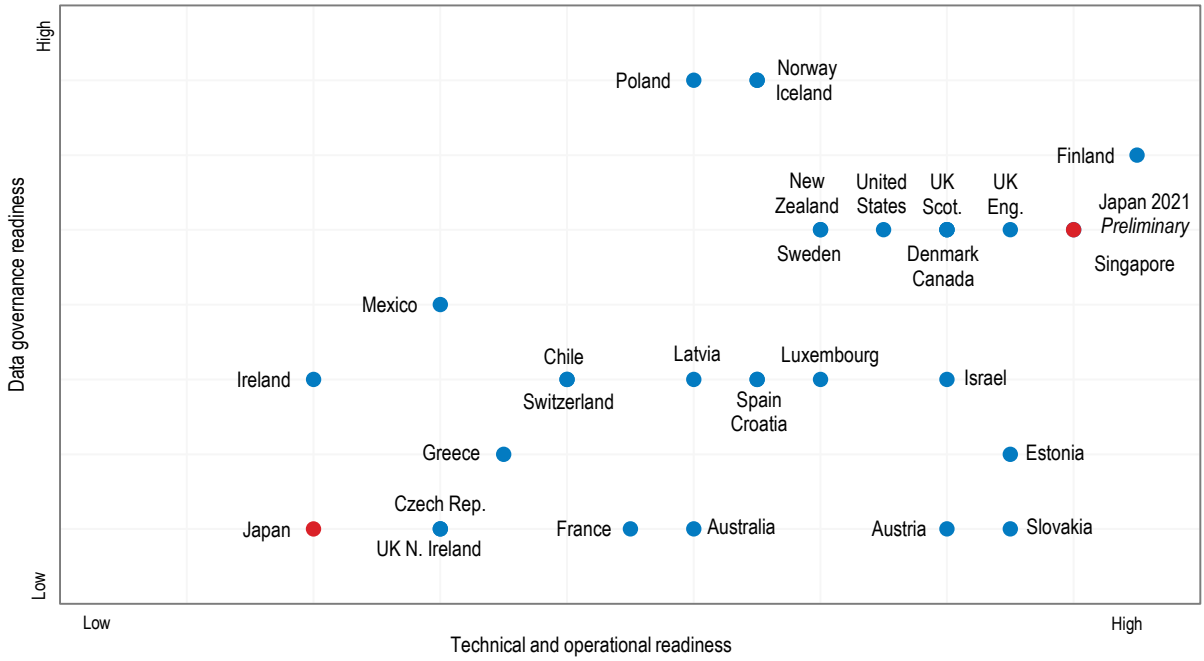
To utilise digital tools, getting the regulatory framework right is essential. However, the readiness to use medical data in Japan was limited (Figure 2.8). In addition, some medical databases, such as the National Database of Health Insurance Claims and Specific Health Check-ups (NDB) and the Diagnosis Procedure Combination (DPC) Database, had been constructed separately and are not linked. The failure to ensure data governance frameworks that enable access to and sharing of data in the public sector could limit the scope for big data analysis. Therefore, efforts are underway to link some of these databases. The government began analysing how to link the NDB and the long-term care database in October 2020. In addition, the government is now aiming to link several health record systems (such as the NDB and DPC databases) with anonymized IDs (name, sex, birthday, health insurance policy numbers, etc). An additional aim is to link these databases with personal information such as residence and income, as well as improve the connection between health and long-term care databases. Making progress on coverage and data integration is important. The room to improve public service productivity is considerable. One estimate suggests that doubling investment to manage health sector data and information would more than pay for itself (OECD, 2019[15]). However, data integration should be carried out in such a way as to ensure that sensitive information is only released to those who need to have access and that publicly available data cannot be used to identify individuals or firms. For example, the Census Bureau in the United States since 2007 has used noise infusion procedures to ensure confidentiality while still allowing disaggregated data to be used by researchers.

At the same time, use of the national personal ID (My Number) card as a health insurance card was rolled out nationally in October 2021. This allows easier identification in hospitals and doctors can access personal medicine records or specific health check-up records more easily online. Wider use of the My Number card could deliver additional benefits by connecting other databases, improving the quality of health care, cost effectiveness and ultimately welfare. For example, it will ease the declaration of medical costs when filing income tax returns. Even though the take-up of the My Number card has been slow, the coverage of My Number card issuance has reached 35%, as of August 2021, six years after its launch. The Japanese government is continuing to encourage more people to apply through various measures,

which has led to an increase by more than 15% over a year earlier. To achieve the target that almost all citizens will be using the My Number cards by March 2023, more incentives will be necessary.

Figure 2.8. Japan has made progress in using electronic health records

Electronic Health Record data governance and technical/operational readiness, 2016



Note: "Japan 2021 preliminary" was calculated by the secretariat.
Source: OECD Survey of Electronic Health Record System Development and Use, 2016; Oderkirk (2017) "Readiness of electronic health record systems to contribute to national health information and research", https://dx.doi.org/10.1787/9e296bf3-en.

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Local governments and the smart city

Many public services for citizens are provided by local governments. In this light, the digital transformation and reforms at local government level are critical for the public's well-being and quality of life. To solve urban and regional problems and create new value by utilising advanced technology and management, the Japanese government has been supporting smart city programmes. Between 2017 and 2020, 200 projects have been launched across 160 areas, covering education, monitoring/safety, disaster prevention, mobility/logistics, energy/environment, finance or public health. The evidence so far suggests that local governments can harness the power of new digital technologies with some, such as Aizuwakamatsu (Box 2.2), making significant progress already in creating a smart city.

However, many projects remain at the stage of "proof of concept". Only 23 projects were rolled out into actual service during 2020. The current target is that 100 programmes will be in use by 2025. The experience so far has highlighted several challenges. These include ensuring the profitability of services, participation of citizens in sharing and using data, and lack of human resources to sustain and develop new services. As many local areas are rapidly ageing and the older population is less comfortable with digital tools, digitalisation might leave some groups behind. It also raises other concerns. To enhance citizens' participation and understanding while safeguarding data security and privacy, it is important to establish clear incentives and to explain and make visible how personal data will be secured and used. For these purposes, traditional facilities and interactions with government agencies are still available. For example, in rural areas, staff in Japan Agricultural Cooperatives support (often elderly) farmers in conducting digital administrative procedures, or local government officials conduct visits to train the elderly

in the use of ICT devices. Support for the use of ICT technology and services or the access to digital services could also be provided in certain public facilities, such as libraries for instance, as is done in some other OECD countries.

Most of the smart city projects are developed individually and are not interconnected. This works in an early proof-of-concept phase, but could raise R&D and organisational costs later on. The current projects and their future development should be evaluated with an aim to disseminate good practice and warn of potential pitfalls. Sharing experiences of successes and challenges, as well as the applications, modules or data for digital services that have already been developed would also help improve cost effectiveness when deploying digital services in other areas. Along these lines, the government developed the "Smart City Reference Architecture" in 2020, including a standard design framework of smart cities and examples of components, such as business model, database and operating systems, in each service area. In addition, the government produced a guidebook to introduce and implement new smart city projects. More efforts along these lines, sharing experience and tools, will be needed as projects begin to be implemented.

Box 2.2. Aizuwakamatsu: digitalisation in a historical city

Aizuwakamatsu-shi (City) is located in Fukushima-ken (Prefecture), surrounded by mountains and a big lake. The city is known as a Samurai city, having witnessed a fierce battle during the transition from the Edo era. The city population of 120 thousand people is ageing relatively fast. Nonetheless, this historical city is developing as a leading smart city in Japan. The initiative started in 2011, soon after the Tohoku (Great East Japan) Earthquake. The city has introduced a management operating system with an information platform, dubbed "Aizuwakamatsu Plus", which provides tailored information on more than 10 digital services, such as transportation, medical care, child care, and tourism. An office complex, "Smart City AiCT", built in 2019, now has 31 companies and over 400 employees. One key element of the initiative is human resource development. The University of Aizu, specialized in education for ICT technologies has been training more than 1000 data scientists, and collaborating with private companies to address the challenges faced by the city. The city uses an "opt-in" model: residents can choose if they want to provide personal information in exchange for digital services. The city officials explain to the residents how personal data are handled, and the benefit of the services. Currently, around 12,000 people have registered with "Aizuwakamatsu Plus" and this is expected to reach 50,000 by 2030, as the city establishes trust while offering human-centred and personalized services. Foreign tourists can benefit from digital services by using the "Visit Aizu" app which provides AI-supported recommendations according to their nationality and preferences.

The Digital Agency and beyond

The Japanese government has prioritised the digital transformation and improving the productivity and efficiency of public service provision. However, significant challenges remain. As mentioned above, the inter-connectivity of databases among central and local governments, and between departments is underdeveloped. The use of private data requires further investment in research, development and deployment. Current ineffective data management procedures and resources reduce the effectiveness of administrative procedures, especially during natural and other emergencies. Public sector officials are often not familiar with designing nor utilising digital tools. A better and more joined-up government should be capable of establishing the governance mechanisms to co-ordinate and integrate public sector organisations for the digital transformation of Japan, including the availability of common tools, standards and platforms to enable a coherent digital transformation. This includes strengthening the data governance approach to enable data sharing across levels of governments, which can improve targeting of social benefits and public good provision, which caused problems during the pandemic.

To address these issues, the Japanese government established a new "Digital Agency" in September 2021, with a staff of 600 officials, including 200 ICT engineers. Although Japan has been working to

implement the Data Exchange Standard for Administration, challenges remain in developing a public sector data policy that frames access, sharing and reuse of high-quality data across public sector organisations (OECD, 2020[20]). The Digital Agency operates in three areas: designing the digital architecture, changing rules and regulations, and establishing digital public goods. The Digital Agency, through making and implementing action plans, has power over other ministries to supervise their actions for digitalisation and to allocate budget for the ministries' ICT systems. One of the key tasks will be to establish a base registry to achieve interconnectivity and efficient storage and use of data. The new agency will then be able to combine and integrate the national government's information systems. This in turn will allow an integrated, user-oriented approach to reforming administrative services and operational systems. In addition, the government will make arrangements so that citizens can use their current national personal ID cards (My Number Social Security cards and Tax Number cards), to complete administrative procedures.

However, the goal is not just to establish a new agency and achieve system interconnectivity, but to improve citizens' well-being and quality of life by raising productivity in the public and private sectors. To achieve this goal, the central and local governments need to be actively supporting the digital transformation. This will require more than just investing in new digital technologies: complementary actions will be needed with respect to administrative reforms, regulatory reforms, work-style labour market reforms and business process reengineering.

Through the digital transformation and related reforms, the government's ambition is to reduce the operating costs of information systems by 30% by 2025. Success here could make further reductions of administrative costs for the private sector feasible. Compliance with regulation is onerous in many sectors (Morikawa, 2020[21]). There is ample room for administrative reform to improve the businesses environment, thereby boosting productivity (Haidar and Hoshi, 2015[22]). The Digital Agency and organisations such as the Council for the Promotion of Regulatory Reform should work together to reduce compliance costs and other regulatory burdens that may impede the digital transformation.

Furthermore, central and local governments will be able to provide proactive (or "push-type") services, becoming more user-driven by anticipating citizens' needs based on the access, sharing and reuse of data - e.g. when they become eligible or when action is required. For example, some local governments, such as Aizuwakamatsu, already provide relevant information automatically to citizens, such as information about childcare facilities, regular vaccinations, health checks and special benefits to families with young children. To achieve high cost-efficiency for these new services, the authorities should set concrete targets and milestones as they move beyond proof-of-concepts trials to broader implementation, and also train their officials to acquire new skills including through training in the private sector.

While the government can take actions on its own to digitise its activities, it can also help improve framework conditions in the private sector and for households. For example, it can unify the multitude of different approaches in a consistent regulatory framework for dealing with personal privacy (such as GDPR in the European Union), or issue guidelines to clarify hours and conditions for teleworking. At the same time, there exist risks that individuals can be identified when databases are linked. In such cases, using techniques such as noise infusion will be required to ensure anonymity. A level playing field is needed for the re-use of data in public, private and academic projects. Greater use of the new digital technologies would be supported by laying out the advantages for sharing personal data and using digital tools. Recent evidence confirms that digital tools lead to lower fees and shorter and easier procedures (Cabinet Secretariat and Ministry of Internal Affairs and Communications, 2021[10]).

The digital transformation and related reforms in the central and local governments should be inclusive. For the vulnerable and people who may not be able to readily use digital technologies, such as many elderly people, low-income households and people with disabilities, easy-to-use software, user-support, and a safety net to use digital tools and services are necessary. At the same time, if the digital transformation aggravates existing inequality or job displacement, support for affected people and retraining should be provided.

The promises of digitalisation for businesses

The impact of the digital transformation is being felt throughout economies as lower costs for data transmission, storage and analysis have expanded applications beyond industrial processes. Digital technologies are automating tasks in both manufacturing and services. Firms are making use of big data and innovative data analysis to improve their performance in supplying goods. And as government begins to use digital tools more effectively, new and better data will become available for businesses to exploit. While there is potential, there is no guarantee that firms will pursue a digital transformation without investment and a supportive policy environment. In their absence there is a danger that the least-productive firms will lag behind further as more productive firms adopt new technologies (Berlingier et al., 2020[23]). And indeed, a divergence between mainly large firms that are highly productive and weaker, often smaller, firms have emerged, threatening to further polarise the economy (OECD, 2019[24]).

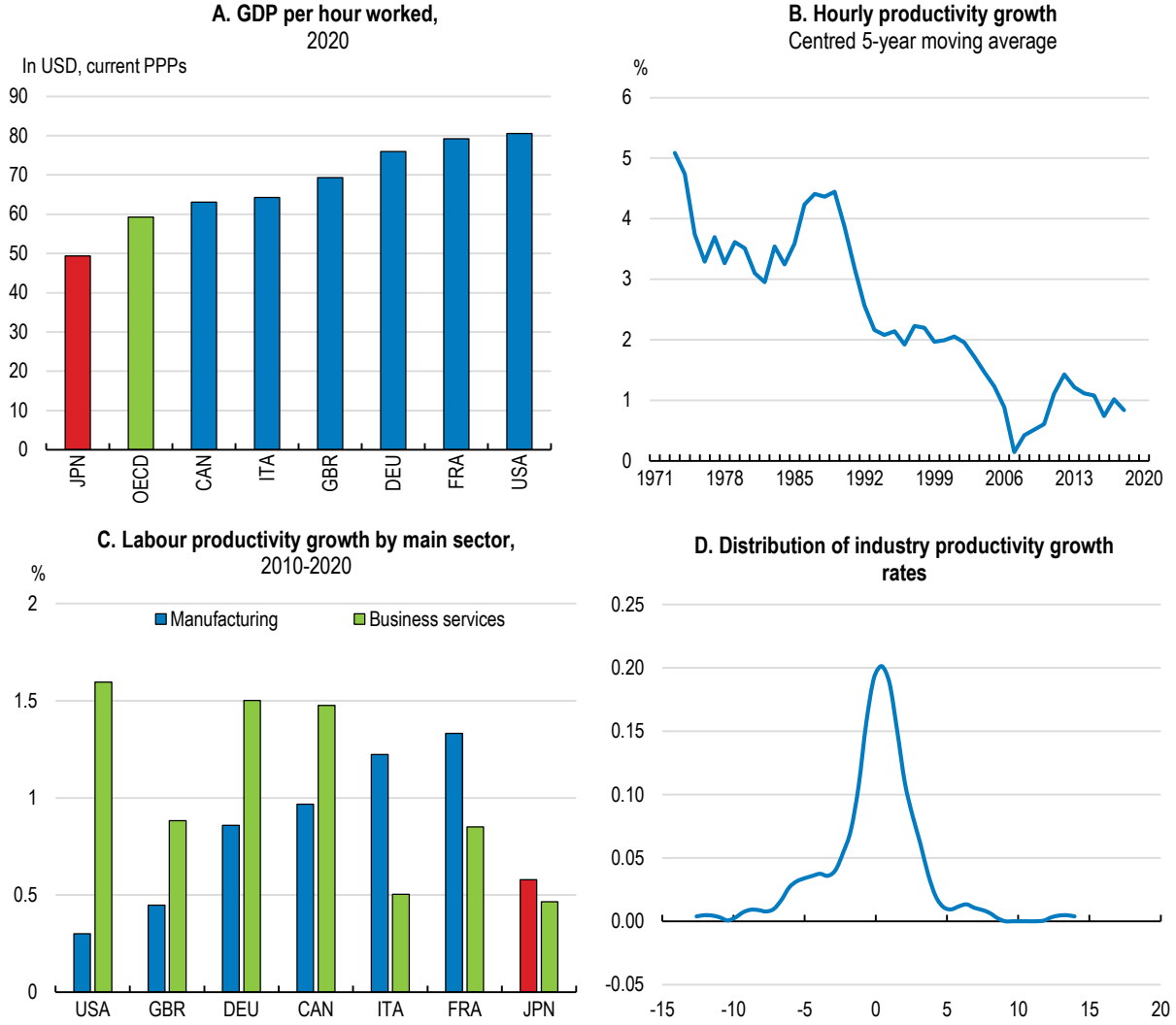
A recent report assessing digital competitiveness across countries ranked Japan only as mediocre (IMD, 2020[25]). This is mainly due to management being insufficiently nimble to react to emerging challenges, inadequate complementary investments in research and development and intangibles (including training and organisational reforms) and a regulatory framework that is less conducive to digitalisation. In part, management flexibility is constrained by entrenched employment practices, especially seniority wages and high costs of employee dismissal, which is discussed above and in previous *OECD Economic Surveys* (Jones and Seitani, 2019[26]). A second issue is a lack of skilled personnel to make best use of new technologies. This is particularly the case in small enterprises and outside the main urban areas. This section examines the concerns constraining investment in both tangible and intangible assets to exploit the potential for the digital transformation to lift productivity.

Weak investment has held back productivity

The level of productivity is relatively weak compared with the OECD average and has failed to converge to higher levels in recent decades (Figure 2.9). Partly, the weak performance occurred as employment shifted out of manufacturing into business services. In addition, weak investment growth has also contributed to the productivity slowdown over the longer run (Goldin et al., 2021[27]). The factors holding back productivity growth, such as low investment in many firms and weak business dynamism, have implications for the digital transformation. The possibilities created by digitalisation to incorporate business services and manufacturing have been exploited to a limited extent (Box 2.3). Realising the opportunities of digitalisation across the economy will likely require business services to become more productive.

The slowdown in productivity has been widespread across OECD economies after the mid-2000s. Nonetheless, in a number of countries the manufacturing sector (especially machinery and electrical equipment in Japan) continued to experience strong productivity growth (Figure 2.9, Panel C). In Japan, after a long malaise, productivity growth picked up in the construction sector. In other sectors of the Japanese economy productivity slowed, declining in a few and stagnating elsewhere. Utilities exerted a negative drag over the decade after the mid-2000s, reflecting the shutdown of nuclear power stations following the 2011 Fukushima disaster. The distribution of labour productivity growth rates by industry between 2010 and 2018 reveals that most industries had very low growth rates with a sizeable share of slightly negative growth, giving the distribution a marked skew (Panel D). Restricting the sample to manufacturing reveals the distribution was less skewed and growth rates somewhat stronger. Labour productivity growth in business services was weak in comparison with other advanced economies (Panel A) and in the ICT sector slightly negative. By contrast, ICT productivity rose rapidly in other advanced economies over the same period (Baily, Bosworth and Doshi, 2020[28]).

Figure 2.9. Labour productivity is relatively weak



Note: In panel B, productivity is defined as GDP per hour worked; In panel C, productivity is defined as real gross value added per hour worked, except for Japan and United States, where it refers to real gross value added per person employed. Business services excludes real estate, data for Canada in business services refer to 2010-2017, data for Japan and United States refer to 2010-2019.
Source: OECD Productivity Statistics (database); and JIP database.

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Rapid capital stock growth at the beginning of the 1990s gave way to a slump following the global financial crisis. Private sector non-residential investment subsequently picked up somewhat accompanying the structural reforms aimed at boosting productivity growth. The growth rate of the capital stock has fallen once more with the onset of the pandemic (Figure 2.12). Firm-level empirical work suggests that the adoption of digital technologies boosts firm productivity (Gal et al., 2019[29]). It shows that stepping up the adoption of digital technologies - such as cloud computing, enterprise resource planning and customer relationship management - can lift multi-factor productivity. It also suggests that more productive firms are better able to transform investments in digitalisation into higher levels of productivity.

Weak productivity growth partly stems from pronounced differences between large and smaller firms. Labour productivity in smaller firms is only around 40% of that in large enterprises (OECD, 2020[30]). Differences in investment account for some of these differences. Investment in advanced and ICT technologies has been concentrated in large incumbent firms whereas diffusion to small and medium-sized enterprises or through new entry has been limited (Fukao et al., 2015[31]). While the digital transformation

promises to boost productivity, the difficulties encountered in diffusing and adopting advanced technologies are serious impediments.

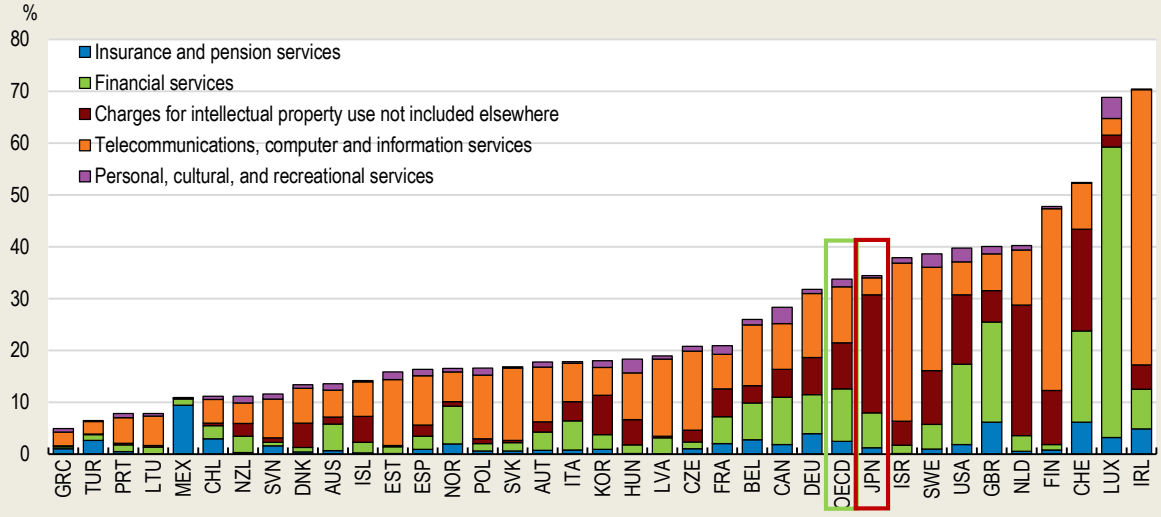
Investments in intangible assets are increasingly important for productivity growth and are complements to investments in ICT equipment. In particular, "digital capital" that encompasses investment in R&D, software and organisational capital appears to be an important determinant of firm performance (Tambe et al., 2021[32]). For example, empirical evidence suggests that investments in organisational capital are important for (new) Japanese firms' growth (Hosono, Takizawa and Yamanouchi, 2020[33]). However, investment in intangibles also appears to be heavily skewed, with large enterprises undertaking the majority of such investments in Japan.

Box 2.3. Business services in exports

Japan is around the OECD average in the importance of digital services in total service exports (Figure 2.10). To a much larger extent than other countries these digital services are mainly for intellectual property use. The share of ICT-related services has been amongst the lowest in the OECD.

Figure 2.10. Digital-related service exports are largely intellectual property products

As a percentage of total services exports, 2019



Source: OECD calculations based on EBOPS 2010, https://www.oecd.org/sdd/its/EBOPS-2010.pdf; and WTO, Trade in Commercial Services, November 2021.

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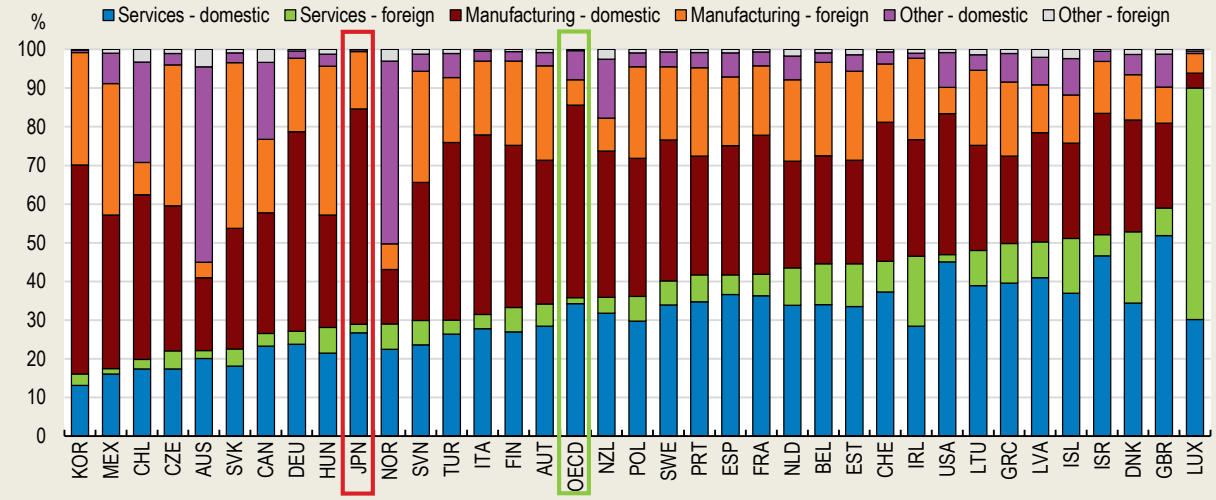
Business services can also contribute to total exports through their contribution to manufacturing exports. Digitalisation and new business models have created opportunities for services to be embedded in manufactured products, a phenomenon known as "servicification". Manufacturing firms increasingly rely on services as inputs, during production, and as outputs bundled with goods (Miroudot and Cadestin, 2017[34]). This is not just that a higher share of value added originates in the service sector, but a shift to more productive activities that are more tightly linked to the consumer.

Servicification often accompanies the outsourcing by major firms of their inputs and the globalisation of production networks. However, the contribution of services to manufacturing exports in Japan in the past has been comparatively low (Figure 2.11). Some empirical evidence suggests that servicification is weak in manufacturing firms and that they remain largely dependent on manufacturing value added (Chun, Hur and Son, 2021[35]).

Figure 2.11. The contribution of services to manufacturing exports is low

Value added share of manufacturing gross exports by industry inputs, 2018



Note: Data refer to total economy covering ISIC Rev.4 sectors 01-99, manufacturing refers to sectors between 10-33, and services refers to business services covering sectors 45-82, other refers to the remaining sectors. Domestic value added refers to direct and indirect, as well as re-imported, value added content of exports.
Source: OECD, Trade in Value Added 2021 edition.

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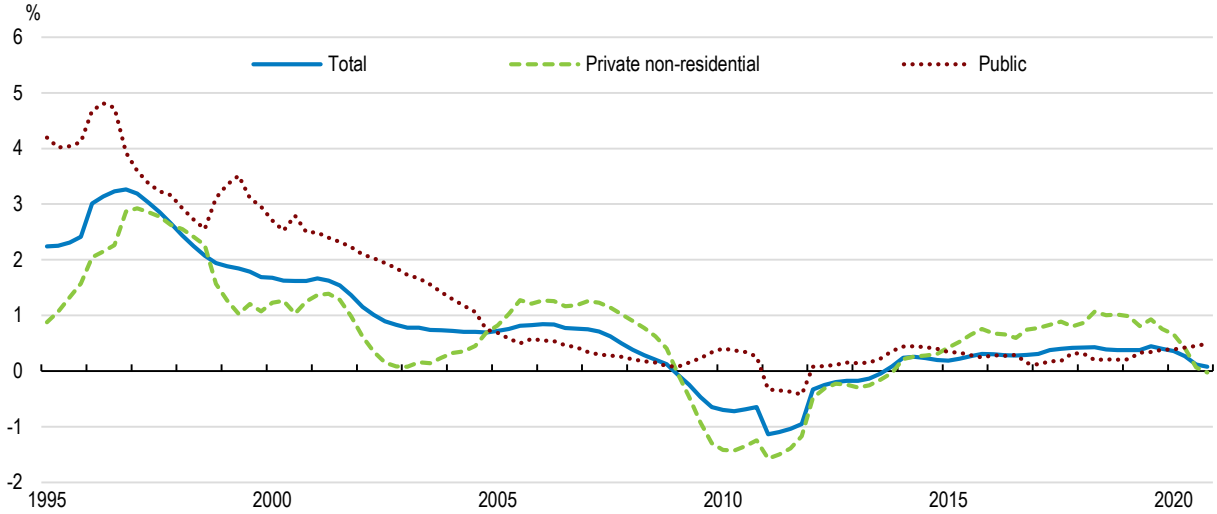
Figure 2.12. Growth of the private capital stock has slowed

Net capital stock of fixed assets year over year growth rate, chain linked



Source: Cabinet Office.

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Some structural factors hold back the digital transformation outside the larger firms. Relatively few workers are employed in ICT task-intensive occupations. This has a bearing on small firms, especially in more remote locations, as the lack of ICT-trained workers constrains their ability to invest in new technologies. As discussed below an older workforce and low job turnover can hinder diffusion. In addition, small enterprises are often very small and with elderly owners without a designated successor, which tends to

reduce incentives to invest in new technology. The median age of SME managers has risen from 47 years in 1995 to 66 in 2015, limiting managerial flexibility in adapting to new digitalisation opportunities.

Furthermore, business process outsourcing, including of ICT tasks, remains relatively underdeveloped. A large share of outsourcing of IT functions, for example, is to affiliated companies. As a result, the available resources for small firms outside these networks can be limited. Concerns about digital security can also become a barrier to pursuing digitalisation without sufficient expertise. The combined effect makes digitalisation more complex and costly for many small firms. However, as already seen, Japanese firms are making extensive use of cloud computing, suggesting that the business process outsourcing market could develop further. Some cities have recognised these difficulties and are endeavouring to improve the enterprise ecosystem (Box 2.4).

Box 2.4. Fukuoka: transforming government and promoting business

The city of Fukuoka has moved fast in promoting digitalisation, recognising the importance of creating a vibrant business environment to encourage the digitalisation of businesses. Fukuoka is a major city on the island of Kyushu. With an airport and a seaport, it is an important regional transportation hub. More recently, it has garnered attention by becoming the city with the highest business start-up rate in Japan. The digitalisation of government and the promotion of start-ups has been a deliberate policy aim since 2012, with the aim of making Fukuoka a dynamic yet liveable city.

The city has been at the forefront of the digital transformation in the provision of public services. The city identified around 3 800 procedures that can now be completed without a stamp (*hanko*) and promoted conducting administrative tasks online or even in convenience stores, rather than by visiting government offices. The authorities recognise that vulnerable groups could be left behind in the push for digitalisation. As a result, in-person facilities and training in the new means of interaction are provided.

As part of the so-called “silicon sea belt” linking areas of east Asia specialising in semiconductors, Fukuoka hosts semiconductor design companies and institutions with large-scale integration (LSI) researchers. The city is promoting the semiconductor sector with the Fukuoka Institute of System LSI Design Industry playing a central role in these efforts.

Fukuoka city is trying to create a business environment to encourage start-ups, including by attracting foreigners. This involves creating supportive organisations (such as business incubators), easing regulatory procedures, agreeing on special treaties for start-up visas and giving some corporate tax advantages in agreement with the central government. As a result, it is the only economic zone for start-ups in the country.

Government support for digitalisation of small firms in other countries also confronts reluctance to invest in new technologies and shortages of qualified personnel. For example, the approach adopted to support investment in robots in France recognised that training of managers and their workforces was essential and so offered a mixture of financial and technical assistance (Faquet and Malardé, 2020[36]).

Spending on R&D can support the development of new products and production processes that can exploit the possibilities opened up by the digital transformation. Spending on R&D is large in comparison to other OECD countries, but relatively little is invested in the ICT sector (Figure 2.13). Over 80% of enterprise R&D spending is in manufacturing, with over one quarter accounted for by the automotive sector alone. Partly as a result, spending is heavily concentrated in large enterprises. Small and medium-sized enterprises play a very small role, lacking the capacity to undertake cutting-edge research. Just 10% of R&D spending is done by small and medium-sized enterprises, whereas the average across the OECD is closer to one-half.

Despite relatively robust spending on R&D and a sizeable registration of patents, measures of patent quality suggest many patents are not as used in follow-on research and this has deteriorated over time (Bahar and Strauss, 2020[37]). By creating a "patent thicket" of intellectual property rights, incumbent firms may deter new entrants attempting to commercialise their inventions and discourage investment (van Zimmeren, 2009[38]). This is a potentially important issue for the digital transformation with the development of new products and processes spanning several intellectual property domains. The competition authorities may need to monitor whether improper strategic use of patenting is hindering the digital transformation. If evidence of abuse does emerge, competition authorities should consider appropriate investigation and enforcement (Shapiro and Lemley, 2019[39]).

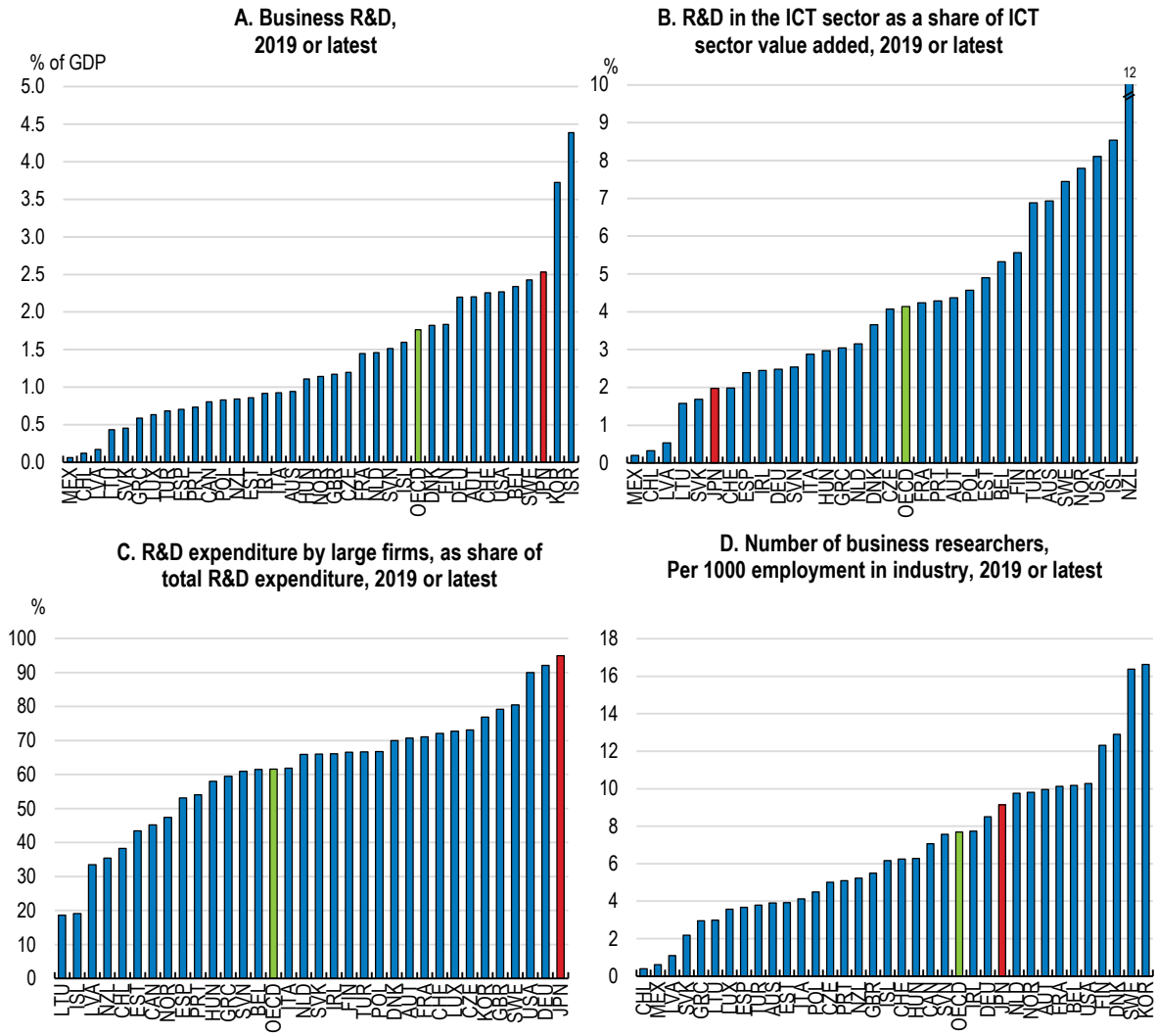
Public support to encourage R&D spending in firms facing financial constraints is available. Overall public spending on R&D in Japan is somewhat lower than the OECD average, with the composition heavily skewed towards tax support rather than direct funding (Figure 2.14). Tax incentives have been found to be effective in promoting R&D spending (Hall and Van Reenen, 2000[40]), although they may also support R&D that would have been undertaken in any case. Furthermore, tax incentives appear to promote experimental development rather than research (Appelt. S. et al., 2020[41]). Small firms' investment can be particularly responsive to these incentives as they are more likely to be credit constrained (Kobayashi, 2014[42]). The effect can be augmented by making tax incentives refundable or allowing them to be carried forward given that new and small firms may have insufficient tax liability. A carry-forward provision was abolished in 2015. As a result, the implied tax subsidy rate for a loss-making SME is well below the OECD average, whereas the rate for a profit-making small firm is around the OECD average (OECD, 2020[43]). In Japan, the share of small companies in overall R&D tax subsidies and also direct financing is very small, and they receive less than 10% of total government support for business enterprise expenditure on R&D (OECD, 2020[44]). Against this background, altering the structure of support could help target different objectives and groups of firms. For example, reinstituting the tax carry-over for new and young firms or making the credit refundable would help them invest in their early stages. Increasing direct grants to new firms would help target support. Other countries, such as New Zealand, restrict tax incentives to small and medium-sized enterprises.

Policy to support investment in ICT tends to target key sectors or technologies. For example, the "Strategic Information and Communications R&D Promotion" programme gives incentives for collaboration between ICT firms, universities and local governments. Supporting firms that have less capacity to adopt new technologies by forging partnerships with universities and research institutes can overcome constraints within the firm. The lack of skilled personnel within firms need not be a limiting constraint. The share of firms collaborating with universities or research institutes for innovation is around the OECD average, though larger firms, particularly in manufacturing, appear to have better linkages (OECD, 2020[45]). Empirical evidence suggests that small technology-based firms can exploit such university research networks as a source of knowledge (Fukugawa, 2012[46]). The second area of government support is through the promotion of innovation hubs focussing on the internet of things with the aim of accelerating the adoption and diffusion of these technologies, particularly in small and medium-sized enterprises and start-ups (OECD, 2019[47]).

More widespread investment in ICT appears pressing. An assessment of the digital transformation on the business sector noted that many firms have antiquated core digital systems and are not investing in updating them (METI, 2018[48]). This leads to the so-called "2025 cliff problem" whereby 60% of all systems will be legacy systems and will cause JPY 12 trillion losses by 2030. In addition, companies and government struggle with differences in ICT systems, which hinder information sharing and mergers of companies (to wit past large bank mergers) and require costly investment to harmonise operations. This situation is aggravated by the shortage of trained personnel, as discussed below. In order to address these investment shortfalls, accelerated tax depreciation allowances for investment in ICT could be considered. However, this may come at a large revenue cost and would thus need to be targeted at the firms most in need of upgrading their information and communication technology. As a result, administration costs would

rise and a regular assessment would be required to check whether policy objectives are being met and whether other means to achieve the same ends offer better value for money.

Figure 2.13. Business R&D spending is high, but not in the ICT sector



Source: OECD, Research and Development Statistics database; and OECD, Main Science and Technology Indicators.

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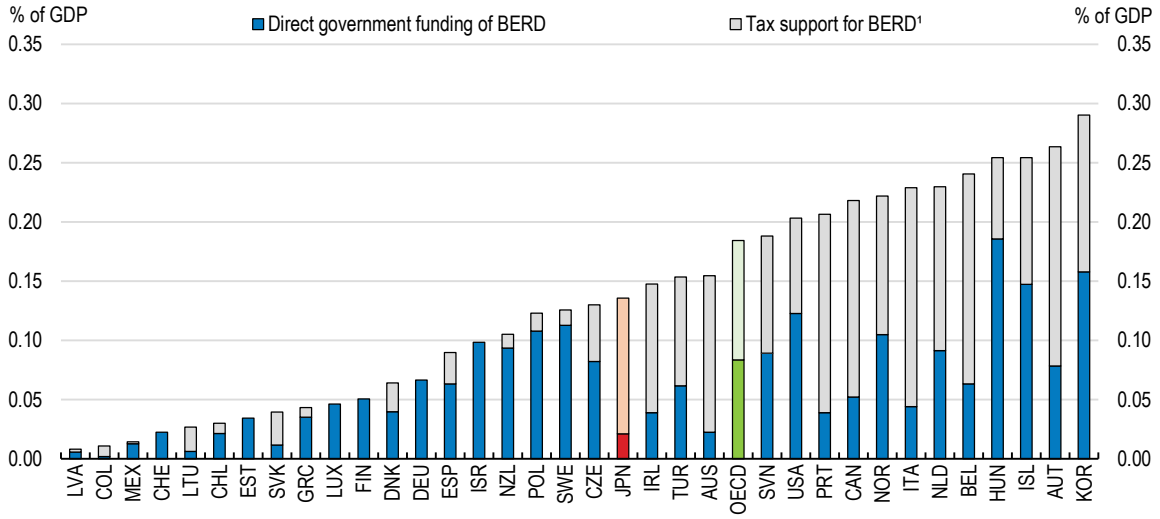
Evidence from elsewhere in the OECD suggests that developing the provision of digital services can offset the need for digital investment. Small firms, in particular, can view digital investment and digital services, such as offered by cloud computing, as substitutes (Andres et al., 2020[49]). For example, Spain in 2015 began promoting cloud computing and other digital services for small and medium-sized enterprises, with support on offer for both the demand and the supply side (Serrano Calle, Pérez Martínez and Frias Barroso, 2016[50]). In Italy, during the pandemic the *Digital Solidarity* programme facilitated access for the self-employed and small enterprises to digital services available from large private sector companies including access to mobile data and cloud computing (OECD, 2021[51]). In this light, some of the shortfall in investment can be met by promoting the development of digital business services and ensuring small and medium-sized enterprises have access to these resources.

Figure 2.14. Public support of R&D spending is largely tax based

Government support for business R&D, as % of GDP, 2018



Note: Subnational tax support for BERD is included in tax support for BERD in Canada, Hungary and Japan. For Spain and the United States, these data are unavailable.
Source: OECD R&D Tax Incentives Indicators.

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Low business dynamism holds back innovation

A final feature of investment is the relative lack of new firms that subsequently grow. New entry and growth also support competition and resource reallocation. Entry rates are among the weakest in the OECD and while they have increased somewhat over time, they remain comparatively low (Figure 2.15). Entry and exit rates are similar in digitally-intensive sectors to the rates elsewhere in the economy. Furthermore, since many of the firms that exit are small this leads to a shift of the workforce to larger firms and towards the service sector. Recognising the importance of a vibrant business sector, the Japan Revitalisation Strategy of 2013 set the target of raising entry and exit rates to 10% by 2020.

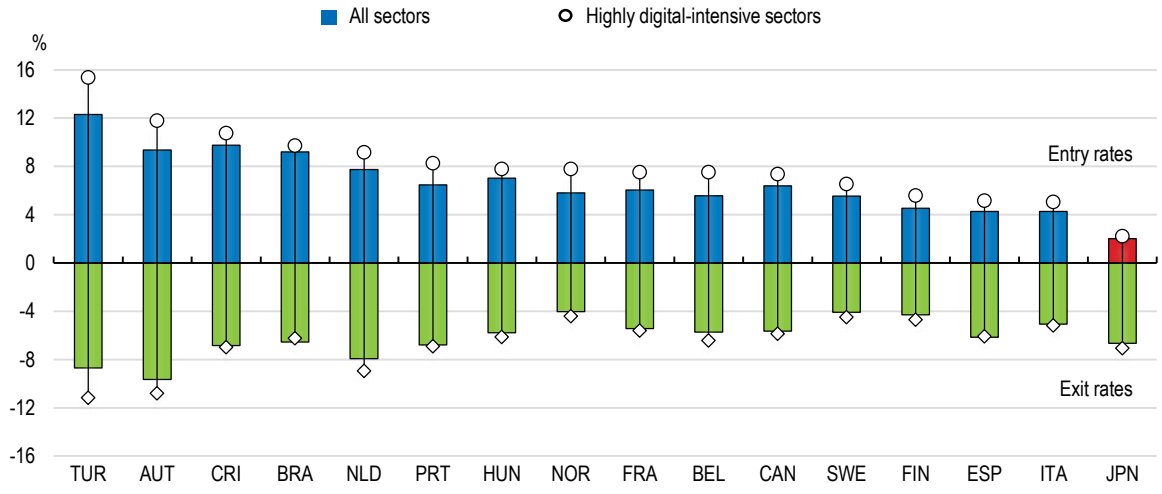
The lack of business dynamism stultifies the “productivity ladder", whereby growing more-productive firms draw in workers from lower-productivity firms, which appears stronger in other countries. This has consequences for workers with relevant skills outside large firms, limiting their opportunities to make a better match and rewarding their investment in skill acquisition. As a result, wage dispersion, reflecting underlying firm productivity, is pronounced and workers have limited opportunities to improve wages by moving to new firms.

The policy environment for starting up a new company is relatively straightforward for licensing. The licensing regime is lean and a “one-stop-shop” provides the necessary information on licensing requirements and can issue licenses and permits. Furthermore, a “silence is consent” rule reduces waiting times for approvals. However, the administrative burden on setting up a business is more cumbersome than the OECD average (Figure 2.16), which is mainly driven by the number of procedures that are required to register a new business. As noted above, the government is trying to reduce the requirements for *hanko* (a physical seal). The cost of producing a *hanko* is not insignificant, at JPY 10,000 to 20,000 (USD 90 to180). For example, from February 2021, it is no longer mandatory to register a carved company seal when applying online for a registration of incorporation. In an increasingly digital business environment switching to digital seals would permit greater flexibility. Already companies are offering digital seals for

individuals to stamp documents accessed on the cloud, reflecting the custom of stamping documents rather than a legal necessity to use a physical stamp. Demand for digital seals has risen during the pandemic as individuals teleworked and wanted to avoid proximity.

Figure 2.15. Firm entry rates are particularly weak

Average entry and exit rates, 1998-2015



Source: OECD (2019) Measuring the Digital Transition: A Roadmap for the Future.

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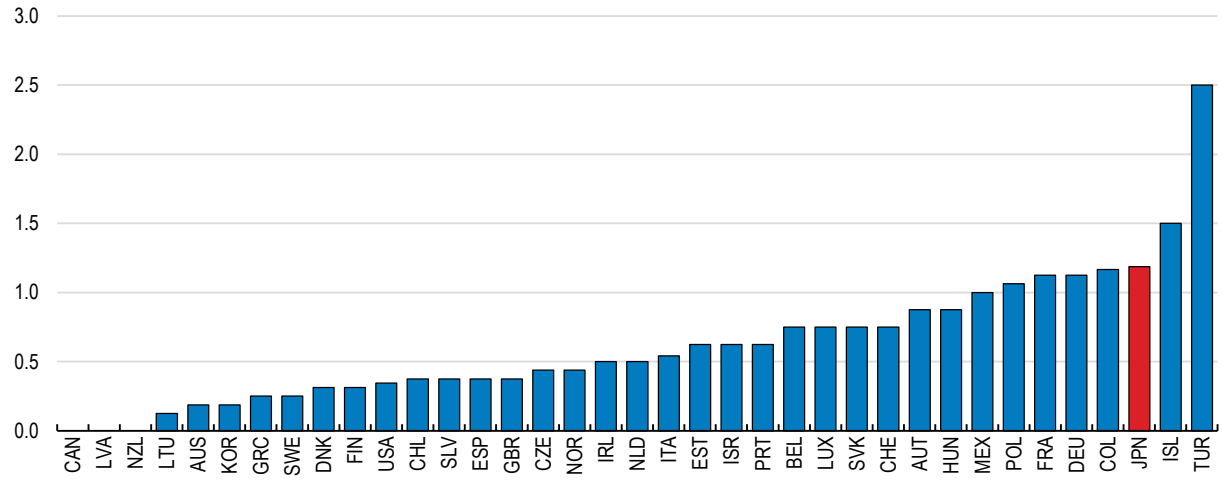
New businesses typically face difficulties as they move from incubation to the growth stage, with cash flow being one of the key constraints. This can pose difficulties given that much of the firm's assets at these early stages are intangible. Bank preferences for collateral and personal guarantees become a potential obstacle. To some extent, this can be overcome by venture capital funds. At present, the size of the venture capital market is comparatively small (Figure 2.17). In the past, most venture capital investments were in start-up and other early-stage phases. The more developed venture capital markets typically make a larger share of investment in later-stage ventures. Experience from elsewhere in the OECD (such as Cooperative Venturing in the United States or the Scottish Angel Capital Programme) suggests that developing the network of "business angels" who not only invest in start-ups, but who can give advice and access to their networks, can help thicken venture capital markets (OECD, 2020[52]).

Government support in Japan for small and medium-sized firms (not necessarily new ones) takes several forms. Funds can be channelled through credit guarantee corporations (Japan Federation of Credit Guarantee Corporation and Japan Finance Corporation). However, such subsidies can be easier to access for small and medium-sized enterprises with established relationships with banks. Efforts are also needed for new firms and the government offers income tax advantages for business angels (the Angel tax system) investing in start-ups. Furthermore, the Japan Patent Office introduced the IP Business Valuation Report and the IP business proposal in 2014 to help financial institutions better understand intellectual property issues when lending to small and medium-sized enterprises. This has supported the development of this part of the market based on intangibles, which can be important for new firms. Some banks, such as Chiba Bank, are now making loans backed by intellectual property.

Figure 2.16. Administrative burdens for setting up a business are relatively large

Countries ranked in ascending order from most (0) to least (6) competition friendly



Note: For limited liability companies and personally-owned enterprises.
Source: OECD 2018 PMR database.

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The Small and Medium Enterprise Agency takes the lead in addressing the difficulties experienced by small and medium-sized enterprises. The agency runs several programmes attempting to support small firms, their growth and avoid their failing. One issue is that small enterprises are often very small and the rate of self-employed who are also employers, as a rate of entrepreneurs, is the lowest amongst OECD countries (Figure 2.18). This is true for both male and female entrepreneurs. They include promoting mergers and acquisitions through tax incentives, which may help consolidate managerial resources. A second approach is promoting business succession through a deferral and exemption framework for inheritance and gift taxes. The policies aiming to prevent firm failures may in the process hinder new entry and keep afloat less productive firms and as such a balance needs to be struck. Empirical evidence suggests that productivity growth is lower in (unlisted) family-owned firms in Japan (Morikawa, 2013[53]). Consequently, policy needs to prioritise targeted support to promising small and medium-sized enterprises, with enhancing entrepreneurship, especially for females. In other countries, such as the Netherlands, the support for small firms is embedded in a wider framework encouraging the entry of new firms and supporting them as they grow (Box 2.5).

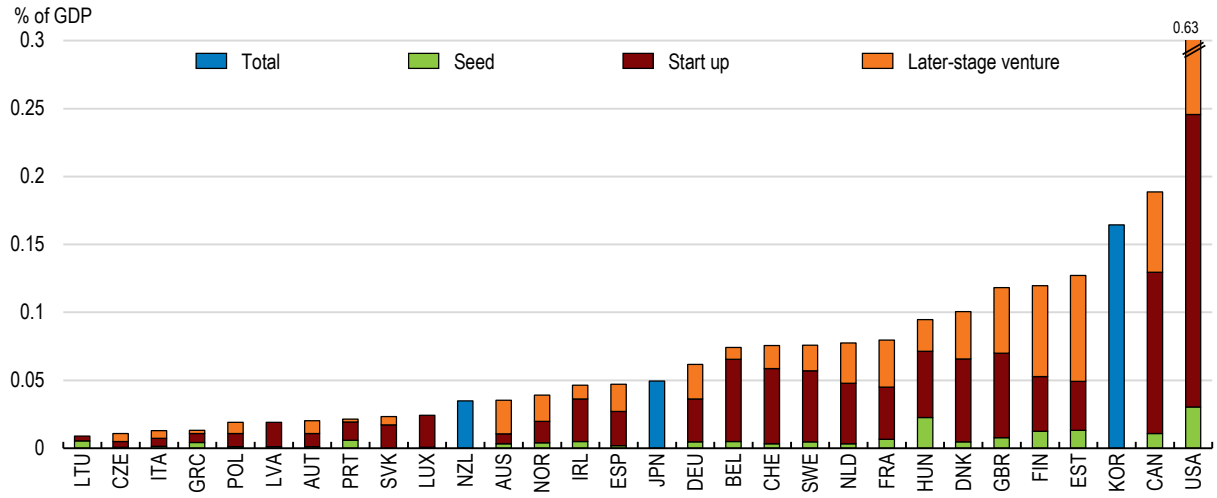
Business dynamism can also be boosted by facilitating exit of less productive firms. When entry and exit complement one another, the effect can be substantial and contribute to lifting overall productivity growth. Alternatively, the survival of low-productivity firms can hamper the reallocation of resources and inhibit entry of new firms. Evidence from across the OECD suggests that the “congestion” created by zombie firms hampers productivity growth, especially for young firms (Adalet McGowan, Muge, Andrews and Millot, 2017[54]). Empirical evidence from Japan increasingly suggests that more productive small enterprises tend to disappear and the less productive firms survive, such that firm exit has a negative effect on productivity overall (Ikeuchi et al., 2020[55]). Part of this is due to large firms acquiring promising start-ups or other small firms. Even so, some high-productivity firms appear to be failing, contributing to the overall weak productivity performance.

The corporate insolvency regime appears comparatively well designed, keeping costs of failure relatively low and imposing relatively few barriers to restructuring (Adalet McGowan, Andrews and Millot, 2017[56]). In practice, however, poorly performing firms have tended to survive. For the individual entrepreneur, the

limited protection of personal assets and the heavy use of (real estate) collateral and personal loans by the banking system can create incentives for rolling over loans (OECD, 2017[57]). In addition, firm failure in practice can lead to personal bankruptcy and loss of the entrepreneur's home. In addition to the loss of the home, fear of social stigma amplifies the risk of declaring bankruptcy. In other countries, or states within countries, wealth exemptions (such as the family home) from personal bankruptcy proceedings appear to support higher entry and exit rates. However, financing may become more difficult as a result.

Figure 2.17. The venture capital market is relatively small

Venture capital investments, 2019 as per cent of GDP



Source: OECD Venture Capital Investments database.

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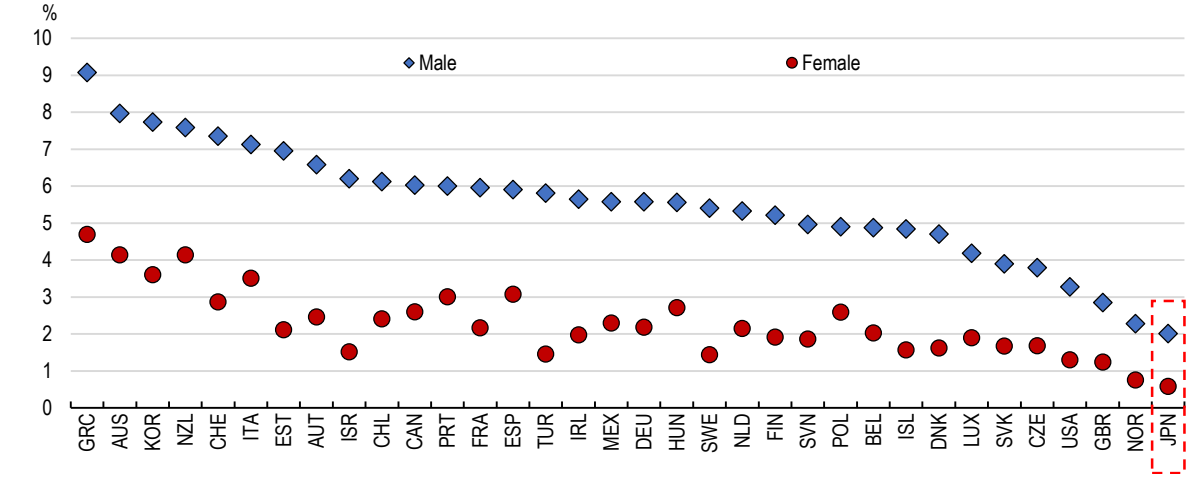
Figure 2.18. Entrepreneurship in Japan is quite low

Share of self-employed who are employers in 2019 or latest



Note: Chile, Mexico, Korea, Australia are in 2017. Israel is in 2016.
Source: OECD Gender Data Portal.

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Box 2.5. Developing business ecosystems in the Netherlands

In the Netherlands, the StartupDelta and subsequently the TechLeap.NL programmes have been running since 2015 promoting the development of regional start-up initiatives, and fostering linkages between these regions. The programmes are public-private partnerships bringing together key actors in government (such as the ministries of economic affairs and education, culture and science) universities, businesses and business associations.

A number of services help start-ups access key resources, including through establishing searchable knowledge databases, creating a platform to facilitate business-to-business linkages for innovation partnerships and investment; and support for research collaboration with universities and companies with R&D capacity. A start-up box guides start-ups dealing with public services and the support they offer. One success was lobbying to reduce the processing time for R&D tax deduction applications for new firms to just one month. The programmes also work with government and are indeed part of national entrepreneurship policy, creating a forum to highlight emerging bottlenecks and promote policies that will help start-ups and scale-ups. This includes attracting key talent, such as skilled ICT workers, including from abroad.

A separate initiative run by a consortium of Dutch universities, also initiated in 2015, aims to strengthen entrepreneurship education. This initiative initially received support from the government. The Dutch Centre for Entrepreneurship (DutchCE) helped bring together existing smaller projects and they benefited from the pooling of capacity to promote research and knowledge sharing. The effect has strengthened the entrepreneurship training available in higher education institutes. The network of centres works to ensure the valorisation of research by transferring knowledge to entrepreneurs, business and government bodies. The network also works with StartupDelta and TechLeapNL. However, this initiative has struggled as entrepreneurship is not a core university subject and some centres have either closed or refocussed their activities. This highlights the importance of aligning university incentives with the business sector's demand for skills.

Source: (OECD, 2020[52]).

Entry and exit can be boosted by ensuring competitive pressures are strong. There is a trade-off in digital sectors between economies of scale and scope and competitive pressures. This is particularly so when economies of scale are important (such as with two-sided platforms) or the costs of meeting regulatory requirements are significant (such as biomedical products). In these cases, firm dynamics may alter as innovations created in small or new entrants are taken to market by large firms with an already developed customer base or capacity to meet regulatory requirements. At present entry and exit rates are not discernibly different for highly digital sectors and the rest of the economy. However, the competition authorities should remain vigilant in policing incumbents' actions to deter entry, which can stifle innovation (Baker et al., 2020[58]). The Fair Trade Commission has revised the different sets of merger guidelines to be able to identify actions that are detrimental to competition. How competition policy needs to adapt to digitalisation is an active area of debate and best practice is evolving (OECD, 2020[59]).

Following the start of the pandemic, various subsidies, concessional loans and loan guarantees shielded enterprises from the consequences of revenue collapses and helped with rental payments or business restructuring. Other subsidies were designed to help enterprises invest to minimise the impact of the pandemic on business, either in digital equipment to allow remote working (a capped subsidy of 50% of installation costs) or in protective equipment to allow continued working in enclosed spaces. These measures prevented the collapse of businesses most affected by the containment measures and behavioural responses. In addition, other subsidies aimed at preserving worker attachment, such as by extending the coverage of the Employment Adjustment Subsidy, potentially reducing the threat of scarring for many workers. One consequence is the very low rate of bankruptcy, which raises questions of whether

crisis-period support could prop up unviable businesses. Empirical evidence suggests that firms performing more poorly before the pandemic were more likely to receive grants and concessional loans (Hoshi, Kawaguchi and Ueda, 2021[60]). While the difference in take-up may not be surprising, it does raise the possibility that support has kept some enterprises afloat.

Firms that have taken on loans may limp on particularly given the revealed reluctance of individuals to close firms or declare bankruptcy. Some sectors may face lingering difficulties due to changes in behaviour (such as fewer individuals using face-to-face services in the hospitality sector). In this case, a desire to extend support to prevent large-scale collapse of enterprises in a given sector could prolong support. This runs the risk of hindering resource reallocation to more productive enterprises. As a result, support measures should become more targeted as the recovery gains traction and move away from loan guarantees propping up ultimately unviable firms. Particularly for small enterprises, moving from debt to equity is difficult due to the large number of firms involved and their typical reliance on bank lending. The European Commission's Temporary State Aid Framework from the start of 2021 allowed some loans up to a ceiling to be converted into grants in certain conditions.

Providing the skills for the digital transformation

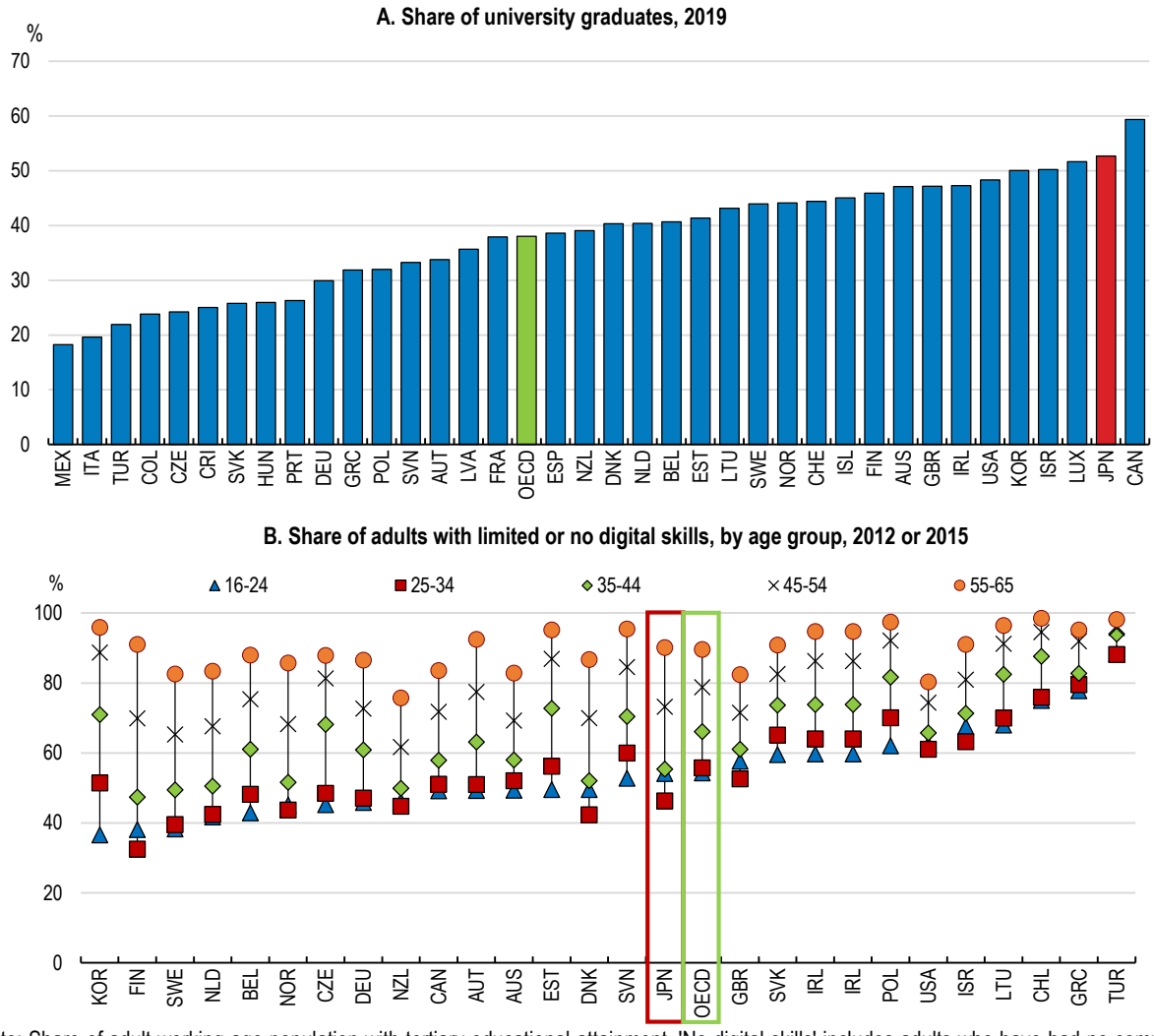
In a highly digitised society, ICT equipment becomes an indispensable tool and ICT skills become almost as fundamental as reading or numeracy. Skills amongst the Japanese population are highly developed. The share of the population with a university degree is amongst the highest in the OECD and measures of adult literacy and numeracy are among the best in the OECD (Figure 2.19). Digital problem-solving amongst adults is comparatively good with 42% of adults possessing strong problem-solving skills, as against 32% on average OECD-wide. However, around one quarter of adults lack basic ICT skills, above the 19% OECD average. To some extent, this reflects that Japan is ageing earlier than other OECD countries. Younger adults are generally more literate and numerate with a larger share having completed tertiary education and having greater familiarity with digital technologies than previous cohorts, suggesting that some weaknesses will diminish over time. That said, digital skill proficiency of younger cohorts is only around the OECD average (Figure 2.19).

While education attainment is high, the changing landscape of jobs and tasks will require new skills to be developed. For example, the spread of automation threatens existing jobs or demands significant changes in how some jobs are performed. The number of such jobs is estimated to be relatively large (56%) in comparison with the rest of the OECD (47% on average) (Nedelkoska and Quintini, 2018[61]). In part, the elevated risk reflects the slower roll-out of digital technologies in some parts of the economy. Those most at risk are workers with lower levels of educational attainment, the young and low paid and those in part-time jobs and working in smaller enterprises.

The impact of digitalisation on workers is uncertain. The fear of robots displacing employment found in some studies (Acemoglu and Restrepo, 2020[62]) appears to be a lesser concern in Japan (Adachi, Kawaguchi and Saito, 2020[63]). In part, this may be due to the export orientation of major automobile manufacturers. Adoption of robots lowered costs and by boosting exports created more demand for labour. Another factor is that some evidence points to robots being complements to workers who possess fewer skills (temporary and part-time employees and the elderly) while raising productivity and average wages (Dekle, 2020[8]). Further automation in the context of an ageing and shrinking population is therefore not necessarily a threat to workers.

Against this background, ensuring the skills are available to make the most of the digital transformation will require action both for the inflow and the existing stock of workers. First, the share of graduates in STEM disciplines is modest, suggesting the skills needed to harness digital technologies fully are not widespread. Second, upgrading skills and reskilling of the existing workforce requires addressing institutional features that hinder adaptation to new challenges.

Figure 2.19. The share of university graduates is high, but digital skills are around average



Note: Share of adult working-age population with tertiary educational attainment. 'No digital skills' includes adults who have had no computer experience, failed the ICT core test or opted out of taking the test. 'Limited digital skills' includes adults scoring below or at level 1 of proficiency in problem solving in technology-rich environments.
Source: OECD Education at a Glance database.

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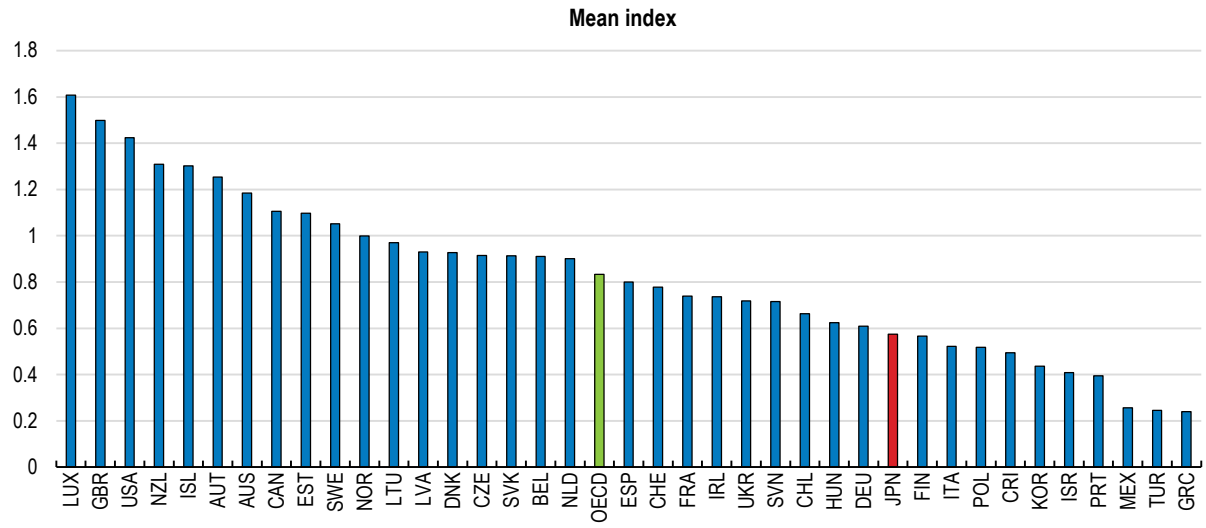
The inflow of workers with relevant skills

The development of relevant skills depends on compulsory education. And education can also benefit from the digital transformation. Better integration of digital teaching technologies could provide individually-tailored education and reduce administrative burdens for teachers. The share of schools with sufficient ICT resources is limited, partly due to responsibility lying at the sub-central government level and differences across local governments in providing digital resources. For example, some prefectures, such as Saitama, have already developed initiatives to expand computer use. The provision of computers per student is well below the average in OECD countries (Figure 2.20). Japanese students have less opportunity to use computers in schools, and less time to do so. Furthermore, access appears to depend more on where the student lives and the school she goes to than on average across the OECD (Figure 2.21). Time spent on the internet is relatively low, both at and outside of school. At home, the relatively limited use was not due

to a lack of access to the internet. On the other hand, relatively few Japanese students have access to a computer at home (OECD, 2021[64]) (Figure 2.22).

Figure 2.20. Computers are comparatively less available in schools

Number of computers per student as reported by the principal



Note: This analysis is restricted to schools with the modal ISCED level for 15-year-old students.
Source: OECD, PISA 2018 database, Table V.B1.5.6.

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To lift basic skills, ICT literacy and promote creativity, the Japanese government has been changing the education curriculum to include programming courses, and launched the GIGA (Global and Innovation Gateway for All) School initiative in 2019. A survey carried out around that time suggested only 12% of schools had enough computers for all students (JAPET, 2020[65]). The GIGA project aims to build an ICT environment to create a learning environment that leverages the best of new technologies and traditional approaches to pedagogy. A large part of the resources being made available are devoted to making sure every student in compulsory education has access to a computer or tablet connected to high-speed broadband (around 13 million students in 35 thousand schools). At the same time, the Ministry of Education is mindful that opportunities provided by ICT should also be available to those who face difficulties in using these technologies and additional resources are available for students needing assistance.

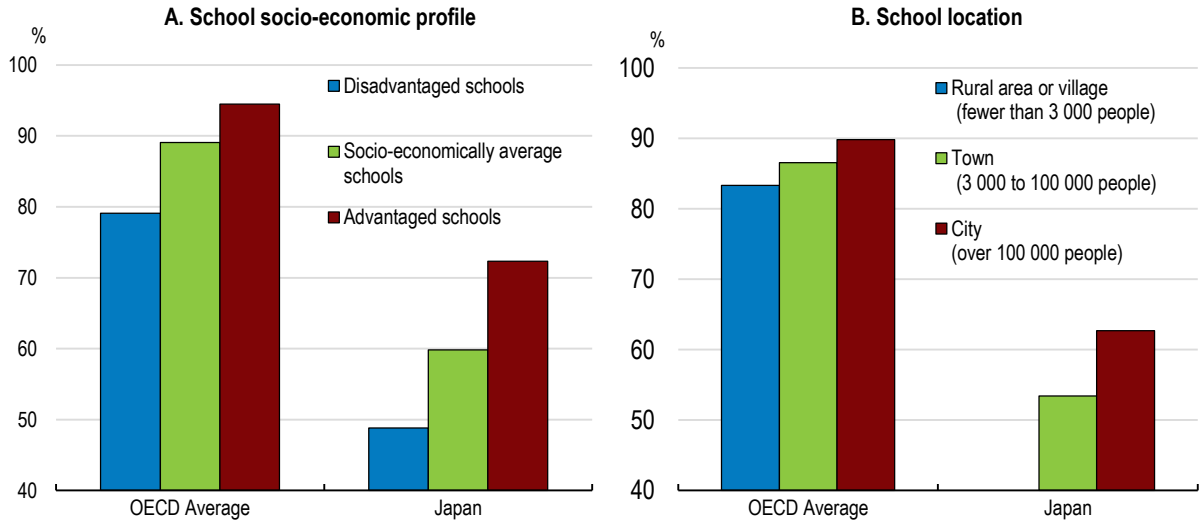
While the GIGA School initiative started before the spread of COVID-19, the shock revealed the heterogeneity of digital ability across areas and schools. It also highlighted the importance of expanding computer availability - by *inter alia* facilitating distance learning and online classes - and the government decided to accelerate GIGA implementation. By the end of March 2021, nearly all school districts (96.5%) were providing one computer per student. Most students can now use ICT networks at school, including the internet.

The budgets in the fiscal years 2019 and 2020 provided around JPY 230 billion per year. Yet effective provision is still not complete. To enhance resilience against a background of pandemic risks, the digital infrastructure and software need to be improved rapidly so that all students can access online-communication and education, with the service tailored to the student's own needs and abilities. More fundamentally, the associated investments to exploit the full functionality of these devices are insufficient. Teachers on average are the least prepared to use ICT resources in the OECD (Figure 2.23). Schools also report that they are among the least well equipped in the OECD to help teachers use digital devices, to

give teachers adequate time to prepare lessons integrating digital technologies, to provide online learning support and to have enough qualified technical support staff (OECD, 2020[66]). In short, the laudable push to provide ICT equipment needs to be accompanied by efforts to ensure teachers can integrate them into their classrooms and teaching methods.

Figure 2.21. ICT access is quite dependent on school type and location

Access to the Internet and a computer that can be used for schoolwork at home, by student and school characteristics



Note: The socio-economic profile is measured by the PISA index of economic, social and cultural status (ESCS). Japan does not have separate data for rural areas or villages.
Source: OECD (2021[1]), PISA (2018).

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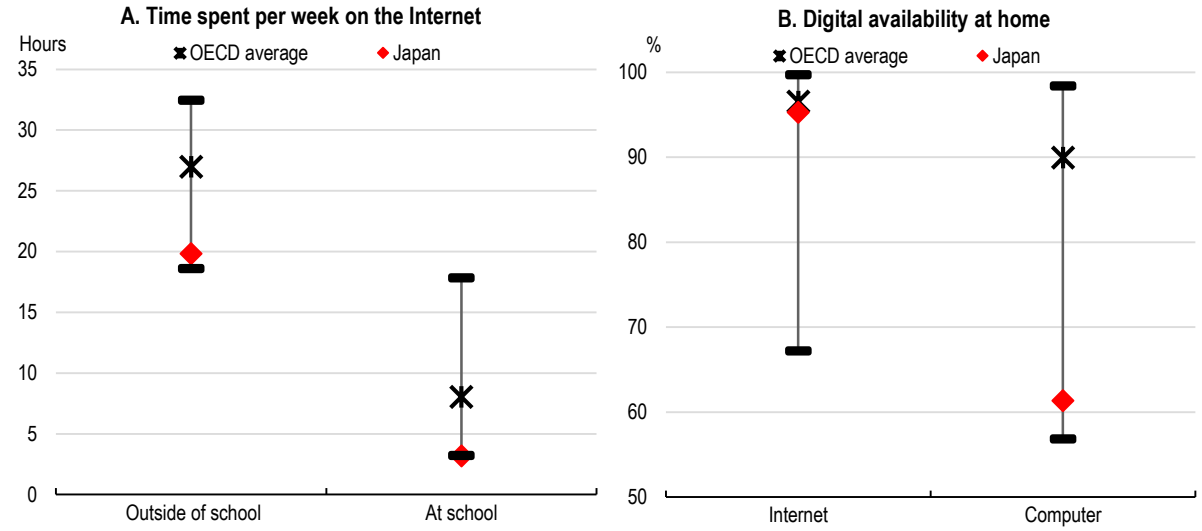
Figure 2.22. Students in Japan spend less time on the Internet and using computers

Digital use of students at school and home



Note: Results based on students' self-reports. Ranges show highest and lowest of OECD countries.
Source: OECD (2021[1]), PISA (2018).

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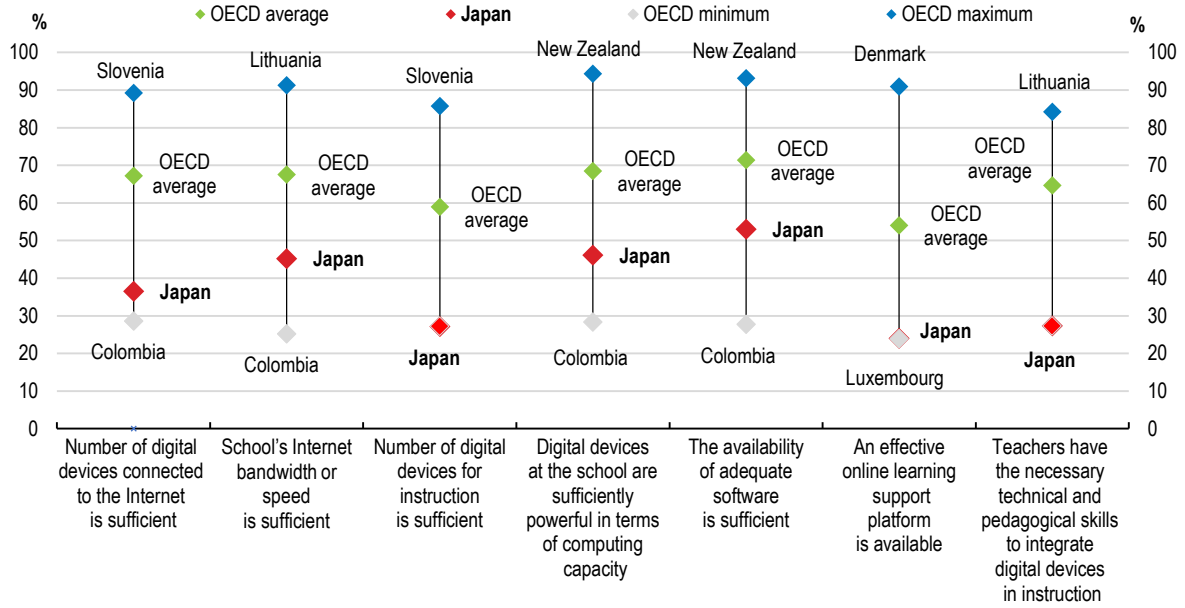
Figure 2.23. Schools are not well prepared for the use of ICT tools

Percentage of students in schools whose principal agreed or strongly agreed with the following statements:



Source: OECD calculations based on PISA 2018.

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These deficiencies held back distance learning and online classes replacing in-person learning during the pandemic. At university level, however, most courses after an initial delay moved online. In addition, local governments, such as Kumamoto city, have been ensuring distance learning was possible for students given fears of natural disasters disrupting education (Kang, 2021[67]). This suggests that the obstacles are not insurmountable and complementing equipment availability with training and plans on usage will allow better integration of ICT into compulsory education.

At university level, there are also weaknesses in teaching graduates relevant skills. Notably, the share of graduates from STEM disciplines is around the OECD average (22% versus 23%) but just 7% of female graduates are from STEM disciplines (Figure 2.24). This is amongst the lowest in the OECD, despite Japanese female students on average outperforming male students in almost all OECD countries in the PISA mathematics tests. Indeed, just 2% of female students are graduating from natural sciences, mathematics and statistics, versus 5% on average in the OECD.

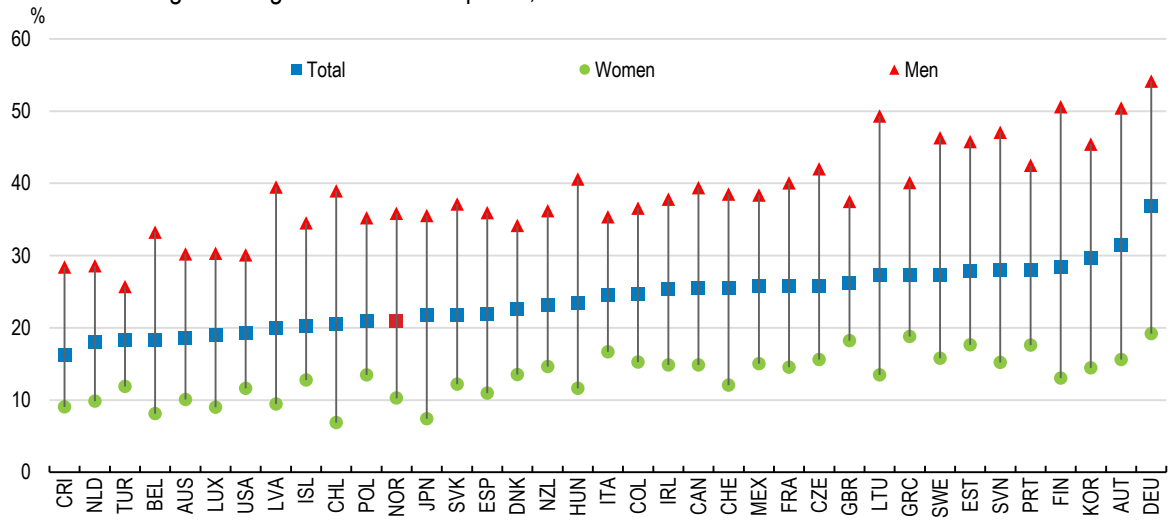
Redesigning university courses may help attract more potential students. In some cases, the perception was that the courses were too academic and divorced from practical application, contributing to the low take-up of STEM courses. Studies suggest that mentoring and exposure to women engaged in STEM research can help improve positive attitudes to STEM disciplines amongst female students (Kijima, Yang-Yoshihara and Maekawa, 2021[68]). Understanding the pronounced gender differences in enrolment and addressing the factors identified appears to be a prerequisite to ensuring that more women take up STEM disciplines. In addition, it is essential to ensure there is no discrimination preventing women taking STEM courses, such as requiring female students to obtain higher marks in university entrance examinations.

According to the OECD Priorities for Adult Learning dashboard, Japan performs poorly with respect to the alignment of education to labour market needs (OECD, 2019[69]). Some 89% of employers report difficulties in hiring workers, and close to 70% of workers report needing training to cope with tasks on their current job. Skill shortages are noted for legal workers, management, finance and insurance specialists, social welfare specialists and care service workers (OECD, 2021[70]). In addition, digital skills are in shorter supply and small and medium-sized enterprises face larger difficulties in hiring workers with these skills. Japan's

2017 Growth Strategy began to address this with the focus on skills development (Government of Japan, 2017[71]).

Figure 2.24. There are few STEM graduates

Share of students graduating from STEM disciplines, % in 2019



Note: For Japan data for Information and Communications Technologies graduates are not given but allocated to different fields of study. The picture does not change substantively when omitting this field of study from the comparison.
Source: OECD Education at a Glance, 2020.

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Other countries are also working to ensure the provision of needed skills. For example, the Converge Challenge programme run by Scottish universities with the involvement of businesses and other interested groups aims to use universities' intellectual assets to develop the expertise being amassed by students into new high-growth businesses (OECD, 2020[52]). This programme provides a mix of training and competition to hone the potential entrepreneurs' ability to commercialise their new product or service.

Training existing workers in new skills

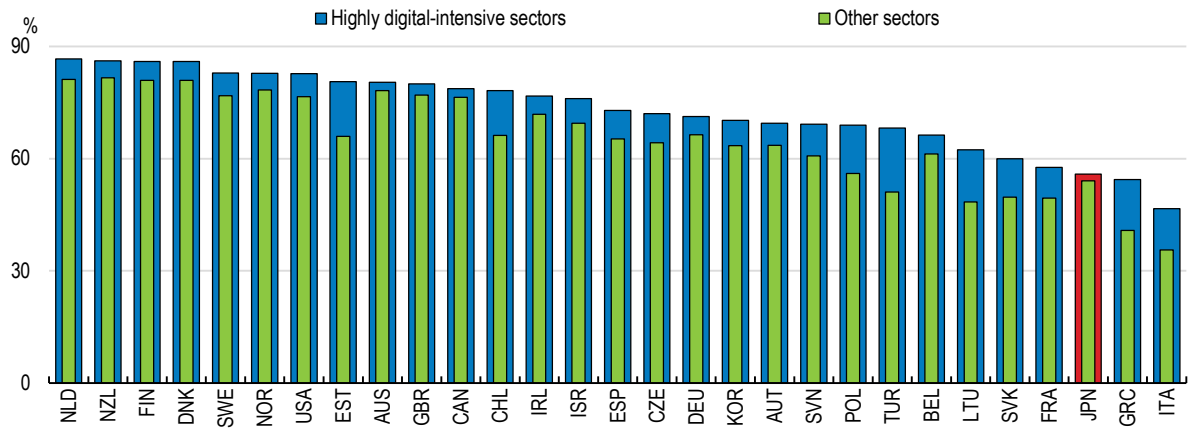
The second approach to building up skills needed for the digital transformation is training the existing workforce. In part, this is needed due to the expected impact of digitalisation on the nature of the work. But another imperative as mentioned above is the potential for digitalisation to be disruptive and require workers to move occupations and retrain. In this regard, training of existing workers needs to occur both within business and outside.

The Survey of Adult Skills estimated that in the early 2010s, 35% of adults in Japan engaged in work-related training in a given year, somewhat below the 39% OECD average (OECD, 2021[70]). In comparison with other countries, the share of workers receiving firm-based training is also comparatively small (Figure 2.25). The relative weakness of training becomes important because workers tend to remain at their firm and job tenure is amongst the longest in the OECD. Indeed, job-to-job flows are muted in comparison with other OECD countries, although they have increased modestly over time (Figure 2.26). In France and Italy, for example, the estimated job-to-job flows as a share of total employment are around 8-10% per annum, roughly the rate of the much more mobile youth in Japan (Berson, De Philippis and Viviano, 2020[72]). The 2015 Survey of Job Changers also revealed that job change was much more likely in smaller businesses, especially in the wholesale and retail sectors, and amongst those at earlier stages of their careers. This constellation of labour market features, in the context of a declining labour force, puts a greater onus on training the existing work force rather than relying on hires to address skill needs. The

government has recognised this and accompanying the 2018 *Work Style* reforms they promoted job change regardless of age. In addition, existing policy supports give vouchers to co-fund job training or professional training that the worker co-finances.

Figure 2.25. Firm-based training is comparatively underdeveloped

As a percentage of workers in each sector group, 2012 or 2015



Source: OECD (2019b), calculations based on OECD Survey of Adult Skills (PIAAC).

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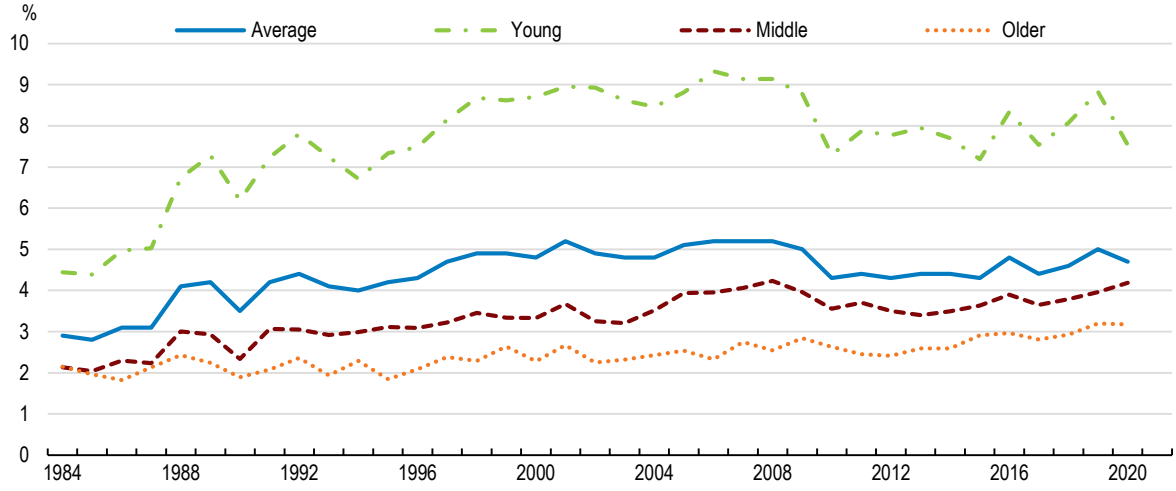
Training is also important in view of skill mismatches. These are relatively large with many workers having higher-level qualifications than needed for new entrants to their jobs. This is more noticeable for workers with post-secondary non-tertiary education. In addition, many are employed in jobs unrelated to their field of study. This is more common in small firms and when the worker is a non-regular worker as well as for workers who graduated from humanities, language and arts disciplines (OECD, 2021[70]). Furthermore, jobs may not make full use of workers' literacy and numeracy abilities. This constellation of training needs means policy should strive to reach beyond workers on a regular contract.

For regular workers, the expectation of lifetime employment, seniority wages and intakes of new graduates rather than mid-career hires creates stronger incentives for firms and workers to invest in training contracts (Jones and Seitani, 2019[26]). The training budget per worker reflects this. Larger firms, which have more lifetime employment contracts, typically spend more on training relative to total employment costs (Figure 2.27). The training budget relative to compensation has at best stood still since the beginning of the century. A second feature is that over the longer term, the number of workers receiving training appears to have declined. Whereas in the early 1990s, over half of regular workers received training, this dropped to closer to 40% by the early 2010s (Hara, 2019[73]). The share of non-regular workers receiving training is even lower. According to the Basic Survey of Human Resource Development the share of firms offering training to non-regular workers is about one-half of the share offering training to regular workers.

Public support is available for worker training. The Human Resource Development Support Grant is a major way the government encourages firm-financed worker training. While it is available for both regular and non-regular workers, the firm needs to submit a plan for converting non-regular workers receiving this training into regular workers, which may undermine its attractiveness for some employers. A subsidy is available for firms granting workers education and training leave but it is limited to full-time employees who are contributing to the employment insurance system. However, take-up is relatively small (9% of employees) with the major barriers a lack of awareness about the different programmes and difficulties in finding replacement staff.

Figure 2.26. Job-to-job flows have trended up modestly

Percentage of workers changing jobs over the past year



Note: February or first quarter data.
Source: "The Special Survey of the Labour Force Survey" from 1984 to 2001, "Labour Force Survey (Detailed Tabulation)" since 2002.

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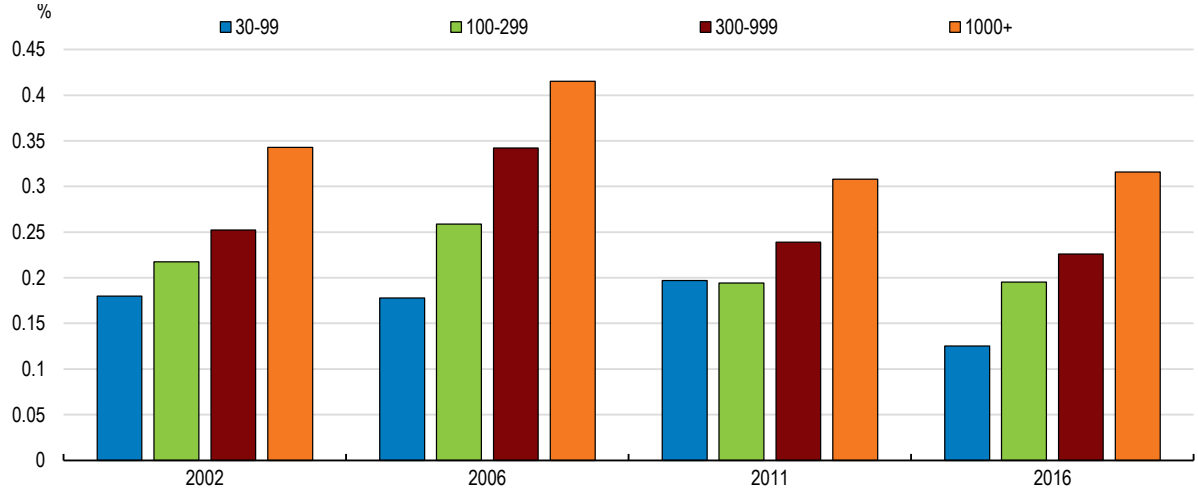
A growing share of the workforce is non-regular employees (Figure 2.28), notwithstanding a small decline in 2020. This type of employment is predominantly occupied by women and increasingly by workers over the age of 60. The split between regular and non-regular employment for younger age groups has remained reasonably stable since the early 2000s, though younger males appear slightly less likely to be in regular employment than at the beginning of the century. The picture is more nuanced for women as the number in regular employment has risen in recent years, reflecting the impact of the labour market reforms aimed at increasing female labour force participation (OECD, 2019[24]).

The rising share of elderly workers on non-standard contracts arises in part due to a downside of the lifetime employment system and its associated seniority wage system. The impact of seniority on wages is amongst the strongest in the OECD. Ever rising wage costs have induced firms to dismiss (less-productive) elderly workers. Firms have used mandatory retirement schemes to achieve this, typically at the age of 60, which the government imposed to stop even earlier forced retirements. This policy is evolving and firms have since 2013 needed to ensure workers remained employed until age 65. From 2021, firms are required to make efforts (though not guarantee) that workers can remain in employment until age 70, although not necessarily within the firm itself. The public Japan Organisation for Employment of the Elderly, Persons with Disabilities and Job Seekers (JEED) supports these efforts by giving advice and providing grants to firms providing employment to workers wishing to continue working beyond the age of 65.

This system obliging firms to keep older workers employed has led to workers being switched to non-regular contracts, thereby allowing compensation to be cut. In order to prevent sharp income shocks for the elderly, some firms have been moving to task-based pay, which would reduce the incentives seniority wages give to fire older workers. Subsidies are available for firms creating such a pay schedule for their employees. The share of firms using merit-based pay schemes has been gradually rising over time. In addition, the 2018 *Work Style* reforms aimed to reduce the differences between regular and non-regular workers, as well as capping permissible overtime hours. The government also issued guidelines targeting labour market flexibility and creating conditions that would support job changes at all ages. Reforms in 2020 established quotas of mid-career worker hires for large firms (rather than relying almost exclusively on graduate hires).

Figure 2.27. Firm spending on training is more generous in larger firms

Training costs as a percentage of total labour costs by firm size



Note: The survey only includes workers in firms with over 30 employees. Before 2016, non-corporate organizations and multi-service corporations were not included.
Source: MHLW Basic Survey of Human Resource Development.

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The elderly often being on non-regular contracts are also less likely to receive training. However, training older workers appears to have a positive effect. Some empirical evidence suggests that training either just before or just after retirement not only increases re-employment chances but also the probability of being re-employed with a regular contract. However, only around 14% of full-time employees regain regular full-time employment after compulsory retirement (Sato, 2017[74]). The majority of workers move into non-regular employment, mainly part-time employment. The transition to non-regular employment is also often accompanied by a change in occupation or sector, entailing a loss in firm or sector-specific human capital.

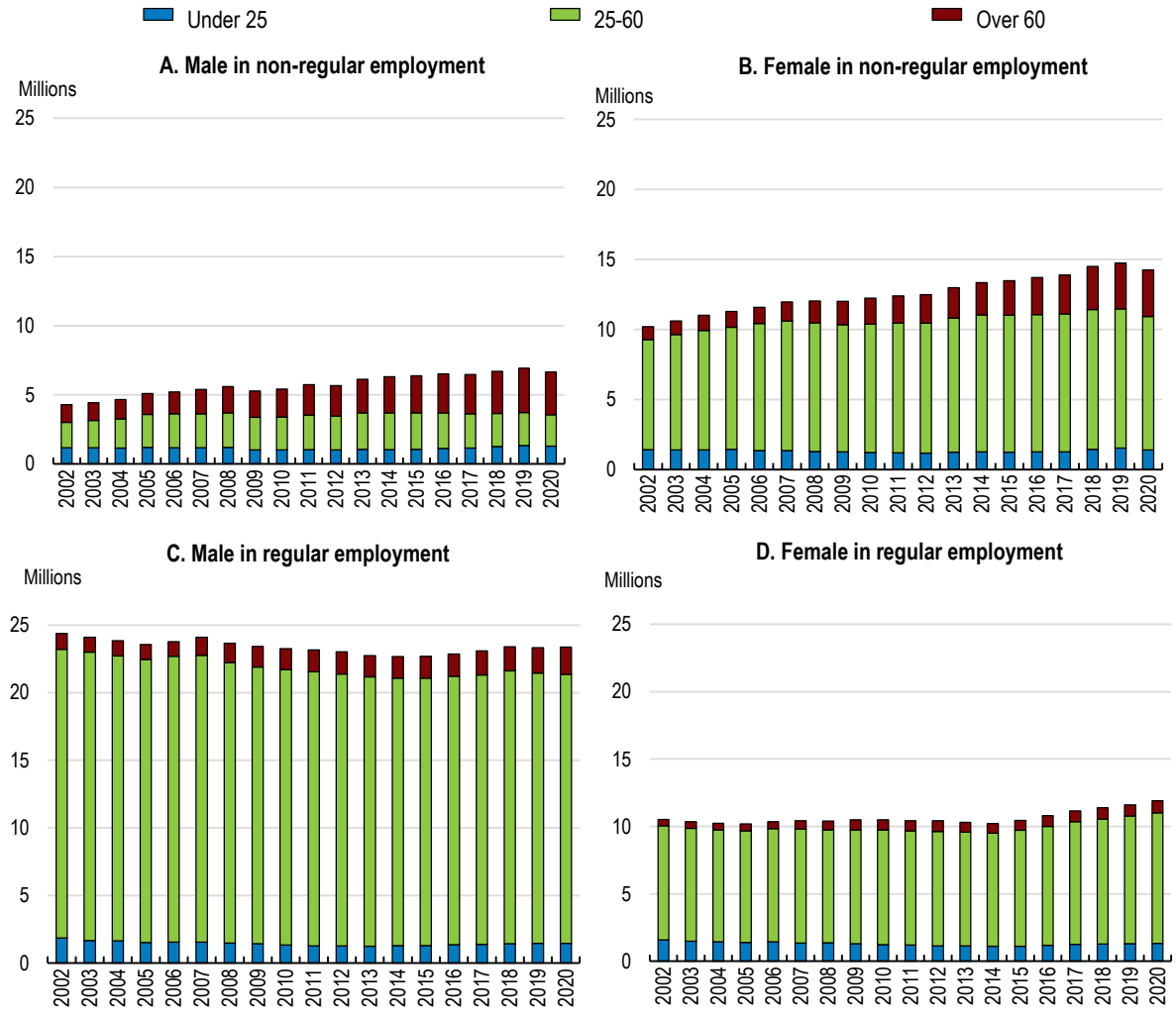
With seniority wages still widespread, labour market fluidity relatively underdeveloped for mid-career hires, and ongoing pressures from an ageing workforce, training needs to be addressed to an increasingly elderly workforce, many of whom are often on non-regular contracts. However, firms, particularly small ones, appear less likely to finance continuing education or training for such workers. A larger share of workers in non-standard employment increases the problems in retraining and upskilling. Some evidence suggests that non-regular workers are less likely to engage in training that augments their earning capacity than the training undertaken by regular workers (Yokoyama, Kodama and Higuchi, 2019[75]). Against this background, the training available needs to be aligned with the skills demanded by firms and workers need to be sufficiently informed about the potential outcomes of their training choices.

The other workers most at risk of lack of training are those in small enterprises. These firms find it less easy to juggle a worker's absence and may face bigger financial hurdles in providing training. Recognising this, the Human Resource Development Support Grant is more generous for small firms. Government also provides subsidies for SMEs that establish certified training centres. The Korean approach of involving large enterprises, employer associations and universities in training centres may exploit scale efficiencies and better forge linkages between smaller enterprises and universities (OECD, 2020[76]).

At present, public institutions play a limited direct role in worker training (around 5% of training participants for workers or jobseekers (OECD, 2021[70]), as policy relies more on supporting firm-based training either within the firm or by external public or private providers. This approach tends to prioritise firm-specific skills and may not be suitable to meet the needs of workers more exposed to reskilling needs or moving to new employment induced by the digital transformation. The polytechnic centres in each prefecture are the main

providers of adult training. They tend to provide technical training related to manufacturing, which does not lead to a degree. The current 46 polytechnics were established by the aforementioned JEED. As seen after the Tohoku earthquake in 2011, when instructors travelled to the affected regions to give needed training, these institutions can be very responsive to changing demands. Provision of adult learning in universities has been relatively limited but more recently the government has begun to promote closer linkages between universities and the business sector. For example, the "Brush Up Program for Professionals" certifies qualifying adult education courses at universities and other higher education institutes. In 2019, over one third of these courses were eligible for benefits (OECD, 2021[70]).

Figure 2.28. Non-regular employment has trended up through the late 2010s



Source: Statistics Bureau of Japan, Labour Force Survey statistics.

StatLink https://stat.link/xau9t2

The digital transformation is creating employment opportunities and demands for skills that were unforeseen even recently, but also offers new opportunities for providing training. For example, distance learning has had a small footprint in training. Before the pandemic, only around a quarter of universities offered distance-learning options. Distance learning promises more flexibility in training provision, which may make it easier for firms and workers to participate. Initiatives are already underway to disseminate training through massive open online education.

However, for workers with less ability to undertake distance learning, provision of face-to-face training will need to be retained to prevent low-wage individuals from falling behind. Efforts are also needed to expand the reach of adult education. As noted above, training is currently less available to non-regular workers and those in smaller enterprises. In addition, those with lower levels of educational attainment and women are less likely to participate in adult learning, reflecting that they tend to be employed in jobs less likely to involve training. Attempts to expand coverage need to bear in mind the costs and programmes should embed evaluation into the design. As such, if trial projects reveal strengths or weaknesses, the programme can then be scaled up or down, or adjusted.

Digitalisation can also provide workers and jobseekers better information on the training available. Such information is available but scattered across different government portals, including the site encouraging adult learning (Manapass), the Ministry of Health, Welfare and Labour site listing courses eligible for training benefits, the public employment service's website for jobseekers, the Job card website for vocational training and an occupational information website. Bringing this information together would help workers and firms navigate training opportunities.

While greater provision of training opportunities offers part of the solution to training needs, the skills acquired also need to be relevant. The alignment of education and business needs is complicated beyond foundational skills because education systems need to forecast skill demands given the training lag (both of the instructors and then students/learners). The current system of curriculum design gives a role to the Ministry of Education, Culture, Sports, Science and Technology through the accreditation of educational institutions that offer suitable training for business professionals to brush up their knowledge. Besides pedagogical aspects of training to qualify for this certification, one requirement is to incorporate systematically the opinions of businesses in the courses offered, which should ensure coherence with local labour market requirements. The Ministry of Health, labour and Welfare is also active in the certification of private vocational education providers. However, the number of institutions certified has been modest, partly driven by the cost of the certification process. Other OECD countries (Austria, France, Korea, Switzerland) provide stronger incentives for certification by limiting the receipt of public funds to these institutions or by ultimately making it mandatory (Slovenia).

Beyond the standard curricula development and skill assessments for the provision of public vocational training, led by the Central Training Council, specific projects have been put in place to support the digital transformation, particularly in the development of IT skills. Training programmes now cover artificial intelligence, the internet of things, cloud computing and data science more generally. Indeed, the Artificial Intelligence Strategy from 2019 supports training to increase the numbers of skilled workers in innovative industries (Integrated Innovation Strategy Promotion Council Decision, 2019[77]). The strategy also recognises the importance of disseminating best practice, which will help different actors react to a fast-changing digital environment.

MAIN FINDINGS	RECOMMENDATIONS (key recommendations in bold)
Elaborating a national approach to the digital transformation	
Databases are not linked and government collections of big data are not easily used by other parts of government or the private sector.	**Develop base registries to link government databases.** **Address regulatory and privacy issues to facilitate greater use of digitalisation.**
Public use of the My Number system is limited which hinders the linking of data for the provision of public services.	Provide more incentives for the public to apply for a My Number card.
Making better use of digitalisation in government	
Government administration can be cumbersome and require physical documents and in-person meetings. Very few administrative procedures are completed online in comparison with other OECD countries.	**Raise e-government supply, service orientation and cost efficiency in the public sector, for instance by building on private sector expertise.** Encourage public sector officials to acquire new skills including through training in the private sector. Drop the need for using stamps (*hanko*) where possible and digitalise administrative and other procedures
Linking databases in some cases would allow individuals to be identified if they were made publicly available.	Use noise infusion techniques to ensure publicly available databases do not allow individuals or firms to be identified.
Many ministries and local governments are experimenting with digitalisation projects without clear goals, targets or evaluation frameworks	Require trials to establish clear metrics to ensure the trials are worthwhile pursuing after the initial phases. Provide incentives to utilise digital tools or big data in public and academic activities. Share best practice and pitfalls to avoid costly duplication.
Helping businesses undertake the digital transformation	
Firm investment in digital capital is limited, particularly in small firms and outside of manufacturing. Productivity growth in smaller firms and business services is anaemic.	Support the development of business services outsourcing that would lessen the need for small enterprises to invest in ICT equipment. Assess the feasibility of using targeted incentives to upgrade critical ICT equipment and processes.
Digitalisation increases the value of investment in intangibles and organisational investments.	**Continue to develop financing methods serving firms with high shares of intangible capital.**
New firm creation is weak and the number of female entrepreneurs is small. low-productivity firms tend to remain in operation.	**Expand access to entrepreneurial training and finance, in particular for women.** Adjust SME support to give greater emphasis to new firms. Support the venture capital market. Increase the wealth exemption from personal bankruptcy to promote exit and entry.
Ensuring people have the skills for greater digitalisation	
Progress in making ICT equipment available for schoolchildren has improved, but teachers and schools are not well prepared to integrate ICT into lessons.	**Provide training and support for teachers to integrate ICT into their lessons.** Disseminate best practice from those school districts that already make wider use of ICT.
The share of graduates in the STEM disciplines is very low, particularly for women. Finding workers with ICT skills is difficult, especially for SMEs and outside major metropolitan areas.	**Reform STEM curricula to make them more attractive to study.** **Promote greater female participation in STEM disciplines, such as through mentor programmes.** Ensure there is no discrimination preventing women taking STEM courses.
Compulsory retirement in firms squanders firm-specific knowledge, increases the likelihood that workers will move to non-regular employment and lack the training needed during the digital transition.	**Continue to raise the compulsory retirement age or abolish it.** **Continue to work with companies to reform seniority wage schemes and promote mid-career hires.**
A growing share of older workers are on non-regular contracts. Training is available but information is scattered across different providers.	Provide a single site that brings together information on all the various training options available and provide guidance for training selection.

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The COVID-19 pandemic hit the economy hard, provoking a marked downturn. Economic activity tumbled as sanitary restrictions restrained consumption and investment. Workers and households with weaker attachment to employment tended to be most affected. However, robust government support and the reopening of the economy led to a partial bounce back. Growth is on course to regain momentum, supported by macroeconomic policies and progress in vaccination. Fiscal consolidation was knocked off course by the crisis and debt has risen even further. A combination of fiscal consolidation and structural reforms is needed to ensure long-run sustainability in the face of demographic headwinds and the costs of meeting more ambitious environmental policy objectives. Pursuing the digital transformation may help boost productivity growth and secure fiscal sustainability. Japan is well placed to benefit from digitalisation, enjoying good infrastructure and skills, though complementary investments are needed. Policies need to facilitate diffusion of new technologies and investment in intangible assets. They also have to ensure that changing demands for skills are met by requisite education and training.

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