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KOREA

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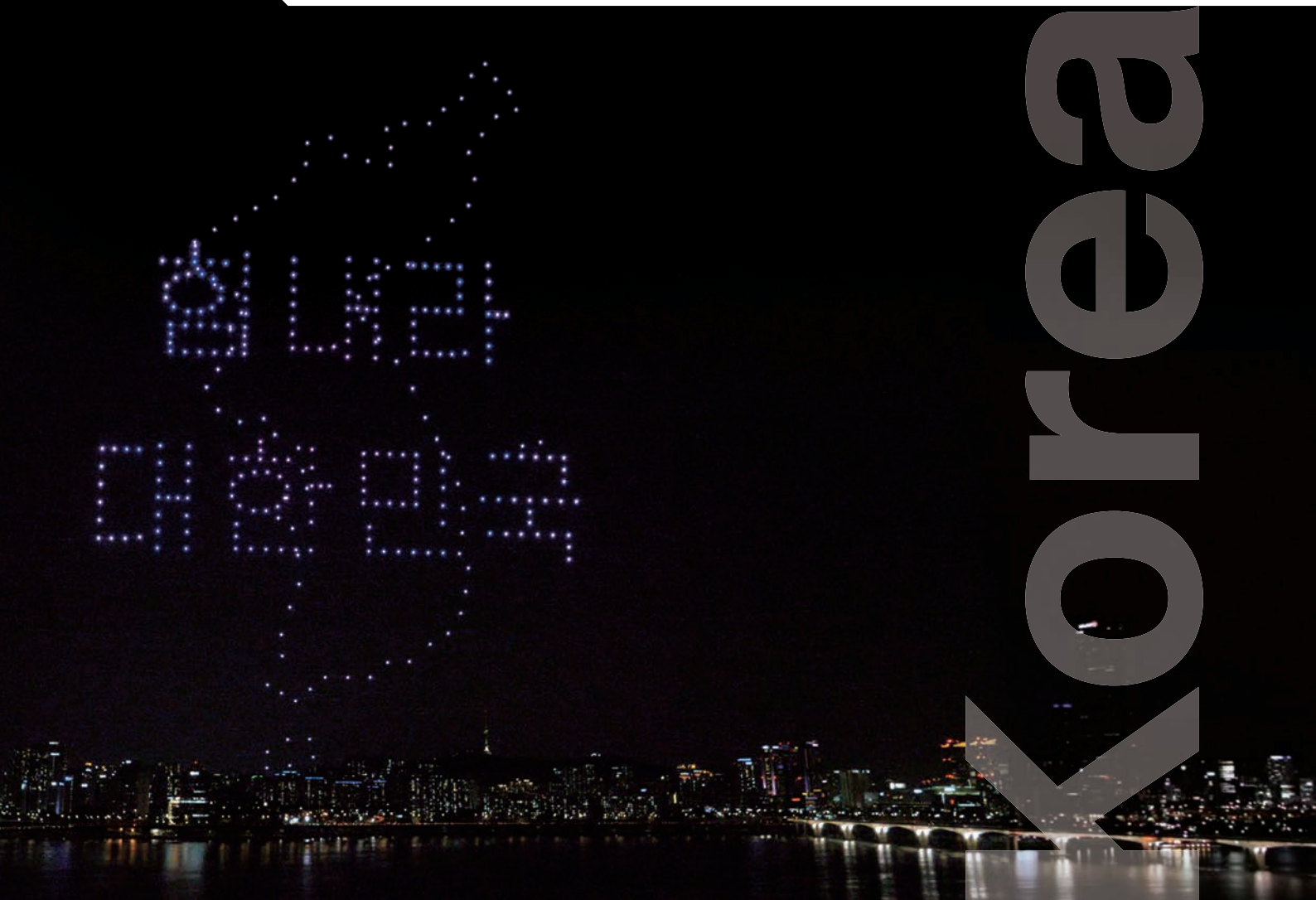
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BASIC STATISTICS OF KOREA, 2018
(Numbers in parentheses refer to the OECD average) [1,2]

LAND, PEOPLE AND ELECTORAL CYCLE					
Population (million)	51.6		Population density per km²	529.7	(37.8)
Under 15 (%)	13.0	(17.8)	Life expectancy at birth (years, 2017)	82.6	(80.1)
Over 65 (%)	14.4	(17.1)	Men (2017)	79.7	(77.5)
International migrant stock (% of population, 2015)	2.6	(10.1)	Women (2017)	85.7	(82.9)
Latest 5-year average growth (%)	0.5	(0.6)	Latest general election		April 2020

ECONOMY					
Gross domestic product (GDP)			Value added shares (%)		
In current prices (billion USD)	1 725.2		Agriculture, forestry and fishing	1.9	(2.5)
In current prices (trillion KRW)	1 898.2		Industry including construction	37.2	(26.6)
Latest 5-year average real growth (2014-18,%)	3.0	(2.3)	Services	60.9	(70.9)
Per capita (thousand USD PPP)	42.1	(47.3)			

GENERAL GOVERNMENT					
Per cent of GDP					
Expenditure	30.3	(40.3)	Gross financial debt (2017)	40.8	(109.5)
Revenue	33.4	(37.4)			

EXTERNAL ACCOUNTS					
Exchange rate (KRW per USD)	1099.6		Main exports (% of total merchandise exports)		
PPP exchange rate (USA = 1)	870.8		Machinery and transport equipment	57.4	
In per cent of GDP			Chemicals and related products, n.e.s.	13.4	
Exports of goods and services	41.6	(55.5)	Manufactured goods	12.3	
Imports of goods and services	37.0	(51.3)	Main imports (% of total merchandise imports)		
Current account balance	4.5	(0.3)	Machinery and transport equipment	31.2	
Net international investment position	24.0		Mineral fuels, lubricants and related materials	27.2	
			Chemicals and related products, n.e.s.	10.3	

LABOUR MARKET, SKILLS AND INNOVATION					
Employment rate (aged 15 and over, %)	60.7	(57.3)	Unemployment rate, Labour Force Survey (aged 15 and over, %)	3.8	(5.3)
Men	70.8	(65.5)	Youth (aged 15-24, %)	10.5	(11.1)
Women	50.9	(49.6)	Long-term unemployed (1 year and over, %)	0.1	(1.5)
Participation rate (aged 15 and over, %)	63.1	(60.5)	Tertiary educational attainment (aged 25-64, %)	49.0	(36.9)
Average hours worked per year	1 993	(1734)	Gross domestic expenditure on R&D (% of GDP, 2017)	4.6	(2.6)

ENVIRONMENT					
Total primary energy supply per capita (toe)	5.6	(4.1)	CO$_2$ emissions from fuel combustion per capita (tonnes)	12.1	(8.9)
Renewables (%)	1.9	(10.5)	Water abstractions per capita (1 000 m³, 2016)	0.5	
Exposure to air pollution (more than 10 g/m³ of PM$_{2.5}$, % of population, 2017)	99.2	(58.7)	Municipal waste per capita (tonnes, 2016, OECD: 2017)	0.4	(0.5)

SOCIETY					
Income inequality (Gini coefficient, 2017, OECD: 2016)	0.355	(0.310)	Education outcomes (PISA score)		
Relative poverty rate (%, 2017, OECD: 2016)	17.4	(11.6)	Reading	514	(489)
Median disposable household income (thousand USD PPP, 2017, OECD: 2016)	27.5	(23.6)	Mathematics	526	(492)
Public and private spending (% of GDP)			Science	519	(491)
Health care	8.1	(8.8)	Share of women in parliament (%)	17.0	(29.7)
Pensions (2017, OECD: 2015)	3.1	(8.5)	Net official development assistance (% of GNI, 2017)	0.1	(0.4)
Education (public, 2017)	4.6	(4.5)			

1. The year is indicated in parenthesis if it deviates from the year in the main title of this table.
2. 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% member countries.
Source: Calculations based on data extracted from databases of the following organisations: OECD, International Energy Agency, International Labour Organisation, International Monetary Fund, World Bank.

Executive summary

COVID-19 triggered a deep recession

Economic activity has fallen sharply. The Korean authorities have reacted promptly to contain the spread of the virus and to support the economy. Even so, GDP is contracting, albeit markedly less than in other OECD countries (Figure 1).

Travel and leisure-related sectors have been hit particularly hard and are recovering only gradually. Manufacturing is affected by the global collapse in demand, notably for petrochemicals and cars. The crisis will leave durable scars and will heighten the need to tackle challenges associated with population ageing and low productivity to boost growth.

Employment is shrinking. The recession is driving down employment, particularly for non-regular workers. The government will need to invest further in active labour market policies to ensure an employment-rich and high-productivity recovery.

Figure 1. GDP falls less than in the OECD

Source: OECD Economic Outlook Database.

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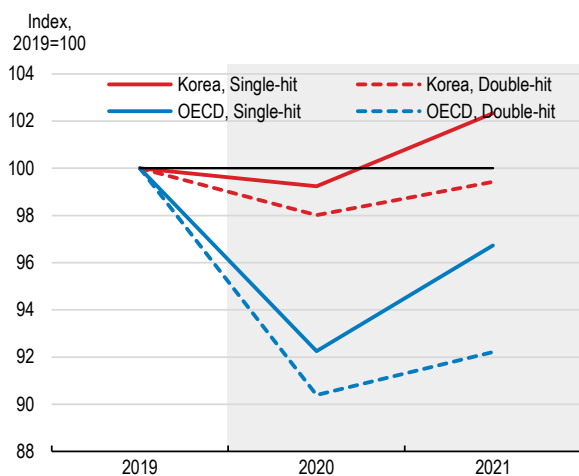
The global recession will slow the recovery. While domestic-oriented activity will normalise gradually, the global recession will hold back exports and investment, even assuming no resurgence of the pandemic (single-hit scenario). A second global wave of infections (double-hit scenario) would delay the recovery in consumption and exports, further depress investment and push up unemployment (Table 1).

A permanent slump in world trade is a downside risk. As an export-oriented economy, Korea is vulnerable to further weakness in foreign demand and to lasting disruptions in global value chains.

Table 1. The recovery will be slow

		Single-hit		Double-hit	
	2019	**2020**	**2021**	**2020**	**2021**
Gross domestic product	2.0	-0.8	3.1	-2.0	1.4
Private consumption	1.7	-3.6	3.7	-5.0	1.7
Gross fixed capital formation	-2.8	2.9	1.4	2.3	1.0
Exports	1.7	-5.7	4.4	-7.6	0.7
Imports	-0.6	-3.3	5.0	-4.3	2.9
Unemployment rate	3.8	4.3	4.3	4.4	4.5
Consumer price index	0.4	0.3	0.3	0.3	0.1
Current account balance (% of GDP)	3.6	2.2	2.1	1.9	1.1
General government budget balance (% of GDP)	0.9	-2.8	-2.8	-3.1	-3.6

Source: OECD Economic Outlook 107 projections updated to take into account incoming data through 23 July 2020.

Fiscal policy is very expansionary. The government is appropriately using the fiscal space offered by strong public finances, with general government gross debt at around 40% of GDP, to damp the impact of the crisis. The budget balance is projected to move from a surplus in 2019 to a deficit of more than 3% of GDP in 2020 in the double-hit scenario and 2.8% of GDP in the single-hit scenario. Fiscal policy needs to continue supporting the economy. Additional stimulus through growth-enhancing investments could strengthen the recovery.

Monetary policy is accommodative. The Bank of Korea cut its policy rate by 50 basis points in March 2020 and by another 25 basis points in May, to 0.50%, and implemented a range of measures to increase liquidity in response to the crisis. With inflation projected to remain very low (Figure 2), monetary policy should remain accommodative. As there is limited room left for significant policy rate cuts, the Bank of Korea should be prepared to consider unconventional monetary policy measures, going beyond liquidity support.

The crisis raises financial vulnerability. The magnitude of the COVID-19 crisis creates risks for

financial stability, especially corporate debt, as some businesses, notably SMEs, are heavily indebted. Some households will also struggle to repay their debt. Nevertheless, Korea's financial system is protected by a number of buffers. The financial authorities have taken determined action to address financial risks and now appear to have stabilised financial markets.

Figure 2. Inflation is set to remain very low
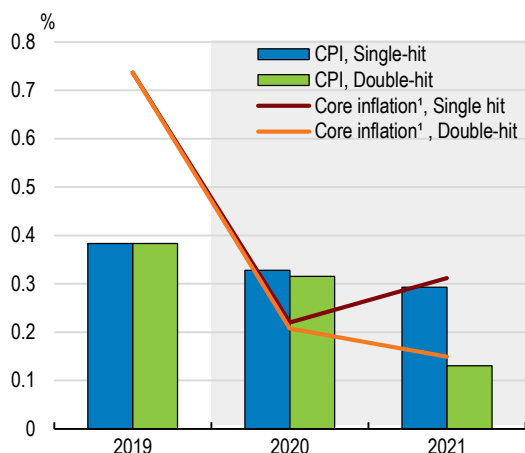
1. Excluding food and energy.
Source: OECD Economic Outlook Database.

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Well-being and inclusiveness need strengthening

Korea scores poorly in some well-being dimensions. The country's outstanding income growth over the past decades has yet to fully translate into high well-being, notably in terms of perceived health, environmental quality and work-life balance.

Income inequality is relatively high, due to wage dispersion and limited redistribution (Figure 3). A dual labour market and partly related large differences in productivity between large firms and SMEs, and between industry and services, generate strong wage inequality. Redistribution through taxes and benefits is weaker than in most other OECD countries. Female employment is relatively low and the gender wage gap is the highest in the OECD. Inequalities are exacerbated by the COVID-19 crisis, which affects

disproportionately those with the weakest labour market positions.

Old-age poverty is still high. More than 40% of people aged 65 or over live in relative poverty, the highest rate in the OECD, albeit on a declining trend. Old-age poverty is driven by limited pension income, partly due to the immature pension system, and low earnings for many of those still working, despite often long working hours.

Figure 3. Inequality is relatively high
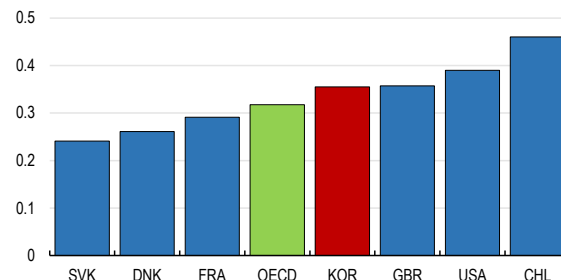
Note: The Gini coefficient ranges from 0 (no inequality) to 1 (maximum inequality). For the OECD, unweighted average.
Source: OECD, Income Distribution Database.

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Air pollution is a major issue. Most of the population is exposed to high levels of small particle air pollution, with detrimental impacts on health and well-being. Although the government has taken significant steps to curb air pollution, more is needed.

Renewable energy investments will help green the recovery. Energy generation is still overwhelmingly reliant on fossil fuels, and low oil prices risk delaying the transition to cleaner energy sources. The government has set ambitious targets for the share of renewables in electricity generation, which should rise from about 8.3% in 2018 to 20% by 2030 and 30-35% by 2040. Boosting investment in renewable energy and clean technologies would help achieve a sustainable recovery.

Ageing and digitalisation create challenges and opportunities

Korea's population is ageing rapidly, but digitalisation could raise productivity. The old-age dependency ratio will be the highest in the OECD by 2060 (Figure 4). Korea has potential to

build on its advanced IT technology to foster innovation and raise productivity. The recently announced *Korean New Deal,* which will boost digital, green and skills investments, has the potential to support a green and inclusive recovery.

Figure 4. The old age dependency ratio will soar
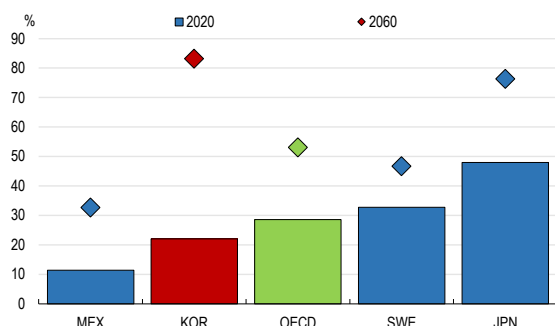
Note: Ratio of population aged 65 and over to population aged 15-64. Unweighted average for the OECD.
Source: United Nations and OECD calculations.

The shrinking labour supply tends to lower the economy's growth potential. According to the OECD long-term model, Korea's annual GDP per capita growth was set to slow to a pace similar to that of other OECD countries. The COVID-19 crisis is likely to pull down Korean and global growth further. However, there is scope for raising employment rates and productivity to lift GDP per capita growth by one to almost two percentage points.

The new OECD Jobs Strategy suggests ways to boost employment and foster inclusive growth. Raising the employment rate and quality of jobs of Korean women, who are on average highly skilled, should be a priority. Moreover, there is a need to enhance the quality of jobs for older workers, who tend to retire late but often end their working lives in low-quality jobs, and to facilitate youth's access to employment, especially through enhanced vocational training and career guidance.

Social protection should be strengthened. The COVID-19 crisis illustrates the vulnerability of non-regular workers to economic shocks, despite emergency measures to support households and businesses. Along with stronger social protection, easing labour market regulations once the COVID-19 crisis is overcome would promote the

reallocation of workers towards their most productive use and reduce labour market duality. While social protection schemes have been gradually extended, compliance remains a challenge.

Shifting the focus of active labour market policy from direct job creation, which accounted for about half of spending before the crisis, to training and job counselling, along with enhanced adult education, would enhance job quality. The crisis-time public job creations need to be complemented by further investments in human capital.

Productivity varies widely across economic sectors. Productivity is outstanding in IT manufacturing and strong in other manufacturing, but lagging in services, including IT services (Figure 5). The gap is also wide between big firms and SMEs. Narrowing those gaps is key to raising aggregate productivity.

Technology diffusion is uneven. Use of advanced IT technologies like cloud computing and big data is lagging in SMEs, which face difficulties in recruiting skilled workers and managers and training their workforce. Scale-up success is limited, despite extensive government R&D support.

Product market regulations remain stringent, holding back competition and productivity growth. The government has introduced a programme to shift the burden of proof from the regulated to the regulator and regulatory sandboxes to allow firms in new technologies and new industries to test their products and business models without being subject to all existing legal requirements.

Figure 5. Service sector productivity is lagging
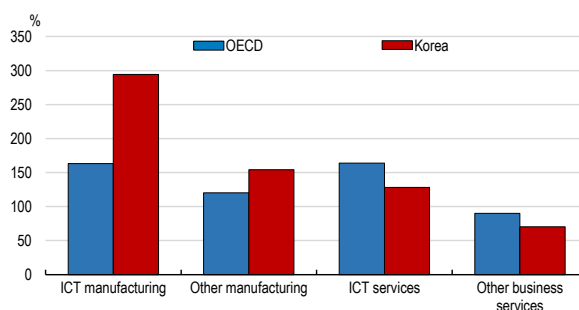
Note: Sectors' productivity relative to total productivity.
Source: OECD STAN Database.

MAIN FINDINGS	KEY RECOMMENDATIONS
Policies to mitigate the impact of the COVID-19 pandemic	
The government has taken a wide range of measures to support households and businesses during the crisis. Prolonging some current temporary measures and/or providing additional support may be necessary if the crisis lingers.	Continue to provide support to households and businesses until the economy is recovering, targeting any additional income support towards low-income households. Ensure that fiscal plans preserve long-term fiscal sustainability.
Sound public finances allow further stimulus to strengthen the recovery.	Support growth-enhancing investments, notably in digital fields, such as 5G infrastructure and artificial intelligence. Perform cost-benefit analysis of investments.
Inflation is set to remain very low over the coming years, the economic recovery is likely to be slow and macro-prudential tools are in place to ensure financial stability.	Maintain accommodative monetary policy and consider unconventional measures going beyond liquidity support.
Raising employment and enhancing job quality in the face of COVID-19 and rapid ageing	
Social protection for non-regular workers and workers in small companies remains weak, exposing them more to the COVID-19 shock, and significant coverage gaps in Employment Insurance remain.	Strengthen protection and coverage for non-regular workers and workers in new forms of employment (e.g. platform workers) and increase compliance with social insurance through more effective enforcement.
About half of spending on active labour market policy is for direct job creation. Public employment service resources are limited. Funding for training programmes has increased in response to the COVID-19 crisis.	Adjust resources for the public employment service and training programmes to maintain effective support for jobseekers.
Korea has no statutory (or coherent privately-regulated) cash sickness benefit, causing hardship and complicating return to work. However, crisis measures were taken in the context of COVID-19. The New Deal includes a sickness benefit implementation study in 2021 and a pilot project for households, including low-income families, in 2022.	Match the introduction of a cash sickness benefit planned in the New Deal with a strong focus on rehabilitation and return to work.
Workers are often forced to retire from their career job in their fifties for various reasons, leading to a waste of human resources and worsening old-age poverty. The mandatory retirement age was increased to 60 in 2016-17.	Expand incentives for workers and employers to ensure that workers stay longer in their career jobs, including through more flexibility in wages, with the view to raising the minimum mandatory retirement age further over time.
Increasing inclusiveness during the COVID-19 crisis and after	
The old-age poverty rate is the highest in the OECD, partly due to the immature pension system, but also to low and restricted means-tested support, despite recent improvements.	Further increase the Basic Pension and focus it on the elderly in absolute poverty. As planned under the New Deal, phase out the family support obligation from the Basic Livelihood Security Programme.
The gender wage gap is the largest in the OECD.	Regularly publish a national-level analysis of wage difference determinants to promote fairer wages across genders.
Promoting the diffusion of technology to tackle the COVID-19 shock and to boost productivity and well-being	
Product market regulations remain tight. However, the government has introduced a programme to shift the burden of proof from the regulated to the regulator and regulatory sandboxes are allowing firms in new technologies and new industries to test their products and business models without being subject to all existing legal requirements. The temporary lifting of the ban on telemedicine during the COVID-19 outbreak illustrates the potential benefits of a timely review of regulations.	Use regulatory sandboxes to identify excessive regulation and revise or abolish it. Facilitate telemedicine, as long as it is compatible with preserving patient safety and quality of care.
Subsidies to SMEs have limited effects on promoting growth and boosting innovation and productivity. Despite the efforts of the Korean government to better target subsidies, the latter still allow the survival of low-productivity companies.	Subsidies to SMEs should focus more on promoting growth and boosting innovation and productivity. Provide SMEs in manufacturing and services with innovation vouchers that can be used to commission R&D and studies on potential for new technology introduction.
SMEs face a lack of skilled workers, notably in digital fields, and their employees have limited access to training. Managers' awareness of the potential of digital technologies is insufficient. The digital skills gap between youth and older generations is the highest in the OECD.	Provide more basic ICT courses to SME employees and older persons, reduce training costs for SMEs and provide targeted adult learning programmes to SME managers.
Environmental policies post-COVID-19	
Notwithstanding an ephemeral improvement as the COVID-19 crisis depressed activity, air pollution is a major challenge, with detrimental impacts on health and well-being.	Tighten caps for air pollutant emissions and strengthen vehicle emission standards.
Effective carbon prices are low and vary across sectors and fuels.	Price CO_2 emissions evenly across sectors and fuels and raise pricing according to a predictable schedule.

1 Key policy insights

The economy will recover gradually from the COVID-19 crisis

Korea was among the first countries hit by the COVID-19 pandemic, but a swift and effective policy response allowed to contain the spread of the virus (Box 1.1). Korea was able to avoid the extensive lockdowns of many other countries (Figure 1.1). Along with a range of government measures to protect households and businesses, this limited the damage to the domestic economy and output is shrinking less than in any other OECD country.

Figure 1.1. Mobility for retail and recreation has remained relatively high
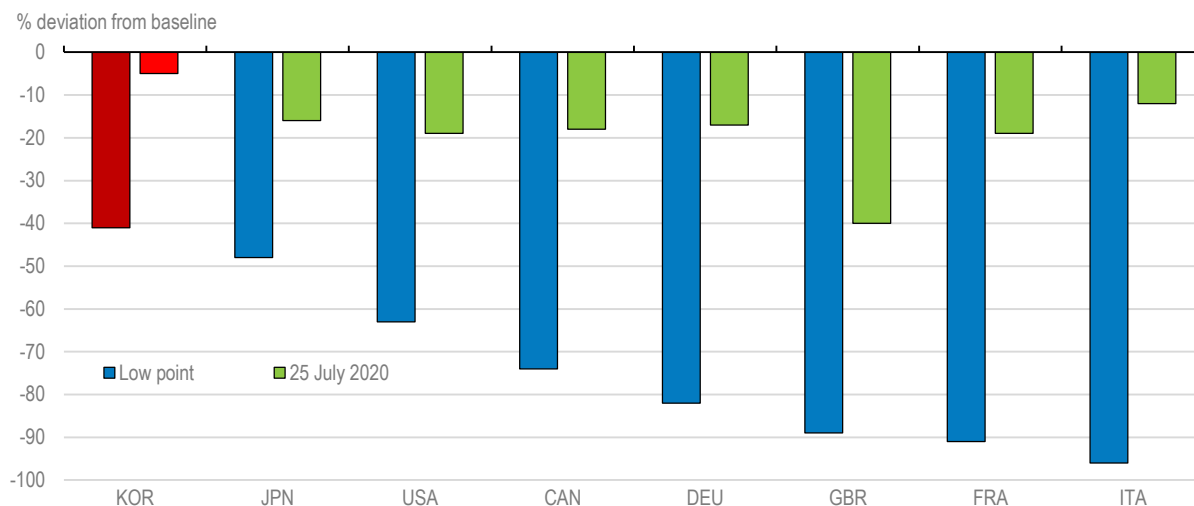
Note: Mobility trends for places like restaurants, cafes, shopping centres, theme parks, museums, libraries, and movie theatres.
Source: Google COVID-19 Community Mobility Report (27 July 2020).

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Box 1.1. COVID-19 Korea's strategy to contain the spread of the virus[1]

Korea was one of the first countries hit by COVID-19, with its first case confirmed on 20 January. Infections surged in the Daegu region in mid-February. However, a prompt reaction and an effective containment strategy allowed to limit the spread of the disease, with the number of new cases declining sharply from early March and the number of daily deaths falling since 24 March to around zero by late April. As of 3 August, 14 389 cases had been confirmed, and 301 deaths. Even though numbers are difficult to compare across countries due to differences in data collection and the varying timing of the

epidemic, and notwithstanding the resurgence of some local clusters in recent weeks, Korea has been among the most successful countries in the world in limiting the spread of the disease and the number of deaths. Moreover, this was achieved without locking down any city or region, which minimised the economic impact of the outbreak.

The containment strategy has been based on foreign entry controls, testing, tracing and treating:

- Entry ban and quarantine: ban on the entry of travellers coming from the Hubei province in China from early February 2020. As from 1 April, all persons arriving in Korea are subject to a 14-day self-quarantine and, as from 11 May, all persons arriving in Korea, regardless of nationality, undergo a mandatory COVID-19 test.

- Testing: innovative methods, such as drive-through and walk-through testing facilities, along with the rapid development of tests, allowed extensive testing. As of 3 August, close to 1.6 million persons had been tested, among which 0.9% proved positive.

- Tracing: rigorous epidemiological investigations are conducted, using credit card transactions, CCTV recordings and GPS data on mobile phones when necessary. Anonymised information on contacts is disclosed to the public and close contacts of positive cases are put under self-quarantine, with their health condition monitored remotely.

- Treatment: patients are classified according to severity and directed towards appropriate treatment paths at hospitals for severe cases and residential treatment centres for milder cases. Health care resources and organisation were adjusted in response to the pandemic.

Digital tools, notably mobile apps, artificial intelligence and devices allowing remote work and service provision (including telemedicine) have played a key role in the strategy to contain the spread of COVID-19 (Chapter 3).

1. For further details, see Annex 1.B.
Source: Ministry of Health and Welfare, Government of the Republic of Korea (2020).

The government has taken appropriate and prompt measures to support the economy and alleviate hardship (Table 1.1). In the first phase of the recovery, temporary support for households and businesses will need to be adjusted gradually according to the pace of the recovery, taking into account the relatively low level and incomplete coverage of unemployment insurance, as well as sectoral specificities. If the crisis lingers, some temporary tax and social security deferrals and reductions will need to be prolonged and additional support for SMEs and firm restructuring may be necessary. Further investment in training and upskilling, along with increased support for the transition towards renewable energy and clean technologies would strengthen the second phase of the recovery, in which fiscal multipliers will be higher. Against this background, the main messages of this Survey are:

- Government support should be provided to households and businesses until the economy is recovering. Low government debt allows for public growth-enhancing investments to spur the recovery and raise productivity. Monetary policy should remain accommodative, and if necessary, unconventional monetary policy measures should be considered to expand the degree of monetary accommodation.

- The government should continue supporting workers after the crisis, especially with help to reskill, so as to facilitate the reallocation across sectors. Lifting labour participation and improving job quality for women and older workers will also remain crucial to mitigate the impact of ageing on labour inputs, and to reduce gender inequality and old age poverty.

- Regulatory reforms to enhance competition and encourage innovation, especially by young firms, and further investments in training and upskilling, notably in digital fields, would facilitate the diffusion of technology and lift productivity.

Table 1.1. Policies to support the Korean economy

Date	Measure	Amount	Main items
		Total support of more than KRW 277 trillion (14.4 % of GDP)	Three supplementary budgets: KRW 59.2 trillion (3.1% of GDP) Financing support (loans and guarantees): over KRW 200 trillion (10.6% of GDP) Other: tax reduction, deferral of social security contributions
5-20 February	Support for the quarantine system, affected families and businesses	KRW 4.3 trillion (Budget KRW 0.3 trillion, financing KRW 4.0 trillion)	KRW 0.1 trillion for preemptive quarantine (budget) KRW 2.0 trillion for SMEs (loans and guarantees) KRW 0.3 trillion for low cost carriers (fee reduction) Policy preparation for worse-hit sectors, such as automobile, aviation, shipping, tourism and export industries
28 February	Support for households and reinforcing the financial sector	KRW 16 trillion (Budget KRW 2.8 trillion, financing KRW 11.7 trillion, tax benefit KRW 1.7 trillion)	KRW 2.8 trillion for consumption coupons and support for family care leave KRW 2.5 trillion for low interest rates loans and guarantees to SMEs. KRW 0.5 trillion for support to local credit guarantee funds (guarantees) KRW 8.2 trillion for liquidity support to the financial sector (liquidity) KRW 1.7 trillion for tax credit for reduction of rents and cut in individual consumption tax on cars (tax benefits)
16 March	Bank of Korea policy rate cut		50 basis point policy rate cut to 0.75% Interest rate cut on the Bank Intermediated Lending Support Facility to 0.25%
Passed 17 March	First supplementary budget	KRW 11.7 trillion (0.6% of GDP) -Expansion expenditure of KRW 10.9 trillion -Revenue adjustment of KRW 0.8 trillion	KRW 2.1 trillion for virus prevention, diagnosis and treatment KRW 4.1 trillion for loans to SMEs and small merchants KRW 3.5 trillion for emergency livelihood support including gift vouchers and deduction in national health insurance KRW 1.2 trillion for aid to employees and severely affected provinces, including expanded employment retention subsidy and financial support Support of epidemic prevention and treatment for designated coronavirus disaster areas
19 March 24 March	Plan to provide financing to companies and stabilise financial markets (bonds and securities)	Initially KRW 50 trillion Raised to KRW 100 trillion (5.1% of GDP)[1]	KRW 22.5 trillion for lending to SMEs, small merchants and self-employed (loans and guarantees) KRW 29.1 trillion to support large and mid-sized companies (loans and guarantees) KRW 17.8 trillion to avoid a credit crunch (loans and guarantees) KRW 20.0 trillion: Bond Market Stabilisation Fund to perform financial functions (liquidity provision funded by financial institutions) KRW 10.7 trillion: Securities Market Stabilisation Fund (liquidity provision funded by financial institutions) Expansion of foreign currency liquidity by raising ceilings on the foreign-exchange derivatives positions of banks and easing foreign-exchange market stability rules (26 and 28 March)
19 March	Currency swap agreement with the US	USD 60 billion	Bilateral currency swap agreement between the Bank of Korea and the US Federal reserve for 6 months (dollar liquidity)
20 March, 10 April, 2 July	Purchase of treasury bonds by the Bank of Korea	KRW 4.5 trillion	KRW 4.5 trillion (KRW 1.5 trillion on 20 March, 10 April and 2 July, respectively) purchases of treasury bonds for market stabilisation.
8 April	Support for exports and start-ups	KRW 10.4 trillion	KRW 10.4 trillion for financial support to export companies and start-ups and ventures (loans and guarantees)
16 April	Support for non-bank financial institutions	KRW 10 trillion	KRW 10 trillion: loans to bank and non-bank financial institutions such as securities and insurance companies for 3 months
22 April	Plan to support key industries and additional financing to SMEs and households	KRW 85.1 trillion	KRW 40 trillion: Key Industry Relief Fund guaranteed by government to purchase corporate debt and equity KRW 35 trillion for additional financing to SMEs (loans and guarantees) KRW 10.1 trillion for special employment security measures

Passed 30 April	Second supplementary budget	KRW 12.2 trillion (0.6% of GDP) *KRW 3.4 trillion financed by debt issuance (the remaining by spending cuts)	Emergency relief grants of up to KRW 1 million (USD 814) to all 21 million households - 2.7 million lower income households can receive grants in cash - The remaining 19 million households receive grants in voucher or credit card points for incentive to consumption A total of KRW 14.3 trillion, including a KRW 2.1 trillion of local government funds, is allocated for the relief programme
28 May	Bank of Korea policy rate cut		25 basis point policy rate cut to 0.50%
3 July	Third supplementary budget	KRW 35.1 trillion	- Creation of about 550 000 jobs in publicly-initiated programmes and strengthening social safety nets (KRW 10.0 trillion) - Emergency loans to struggling small merchants, SMEs and large businesses (KRW 5 trillion) - *New Deal* projects investments (KRW 4.8 trillion)

1. More detailed information can be found in Annex 1.B.

The recovery will probably be slow and uncertainty is exceptionally high

The COVID-19 crisis has led to falls in GDP of respectively 1.3% and 3.3% in the first and second quarters of 2020 (quarter on quarter, seasonally adjusted). The upswing in employment was abruptly interrupted in March (Figure 1.2, Panel A). The contraction is much smaller than in Canada and the United States, and comparable to the decline in Japan – in Europe, short-time work schemes damped the impact of lockdowns on employment (Panel B). The fall in employment in Korea affects most economic sectors, but is particularly severe in wholesale and retail trade, accommodation and food. Employment falls most among temporary and daily workers, as well as small business owners (Figure 1.3).

Figure 1.2. The COVID-19 crisis has hit employment hard, albeit less than in most other countries
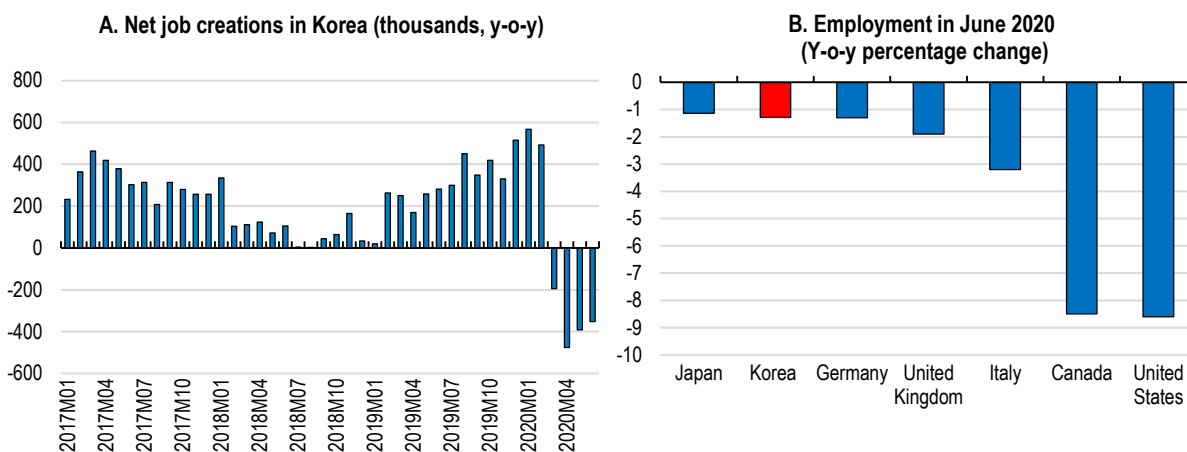
Note: For the United Kingdom, Office for National Statistics experimental monthly estimates of paid employees; For the United States, nonfarm employment.
Source: National statistical offices.

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For an export-dependent economy like Korea, further disruptions in world trade and global value chains would be particularly harmful (Table 1.3). Exports are fairly concentrated both geographically and in terms of products (Figure 1.4). China and the United States combined account for nearly 40% of exports and Korea is deeply integrated in global value chains (GVCs), particularly for electronic goods. The outlook for semiconductor exports remains uncertain despite encouraging developments before the outbreak of the COVID-19 crisis (Figure 1.5). The increasing diversification of Korea's trade relations will increase its resilience over time. Several bilateral free trade agreements (FTAs) have been signed, most recently with Indonesia, Israel and the United Kingdom (to preserve bilateral trade relations after Brexit). Korea aims at pursuing FTAs with more partners and is also part of the Regional Comprehensive Economic Partnership (RCEP) under negotiation with the ten ASEAN countries, China, Japan, Australia and New Zealand.

Figure 1.3. Employment drops in services and among non-regular workers

Year-on-year percentage change (unless otherwise specified), June 2020

* Percentage points.
Note: The self-employed are divided between employers and own-account workers.
Source: Statistics Korea.

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The projected contraction in GDP in 2020 is considerably milder than in other OECD countries, both in the single-hit scenario, which assumes no resurgence of the pandemic and in the double-hit scenario, which posits a global second wave of infections (OECD, 2019a). Private consumption will pick up as distancing recommendations are eased, albeit at a moderate pace as households exercise caution and suffer from income losses and relatively high unemployment. Industrial production will also normalise, but global supply chains will continue to experience disruptions for some time. The global recession is bound to have a durable impact on Korean exports and investment, especially in the double-hit scenario (Table 1.2).

Table 1.2. Macroeconomic indicators and projections under two epidemiological scenarios

	2019	Single-hit scenario		Double-hit scenario	
		2020	2021	2020	2021
		Percentage changes, volume			
GDP at market prices	2.0	-0.8	3.1	-2.0	1.4
Private consumption	1.7	-3.6	3.7	-5.0	1.7
Government consumption	6.6	7.1	5.9	7.3	6.0
Gross fixed capital formation	-2.8	2.9	1.4	2.3	1.0
Final domestic demand	1.1	0.4	3.4	-0.5	2.3
Stockbuilding[1]	0.1	0.0	0.1	0.0	0.1
Total domestic demand	1.1	0.3	3.4	-0.5	2.4
Exports of goods and services	1.7	-5.7	4.4	-7.6	0.7
Imports of goods and services	-0.6	-3.3	5.0	-4.3	2.9
Net exports[1]	1.0	-1.1	-0.1	-1.5	-0.8
Consumer price index	0.4	0.3	0.3	0.3	0.1
Unemployment rate (% of labour force)	3.8	4.3	4.3	4.4	4.5
General government financial balance (% of GDP) [2]	0.9	-2.8	-2.8	-3.1	-3.6
Current account balance (% of GDP)	3.6	2.2	2.1	1.9	1.1

1. Contributions to changes in real GDP.
2. The structural general government financial balance has not been estimated in OECD Economic Outlook 107.
Source: OECD Economic Outlook 107 projections updated to take into account incoming data through 23 July 2020.

Figure 1.4. Exports are fairly concentrated in terms of countries and product types (%), 2018

By destination

- China
- United States
- European Union
- Japan
- India
- Mexico
- Australia
- Indonesia
- Other

By product type

- Electronics
- Chemicals
- Motor vehicles
- Metals
- Electrical
- Other transport
- Other
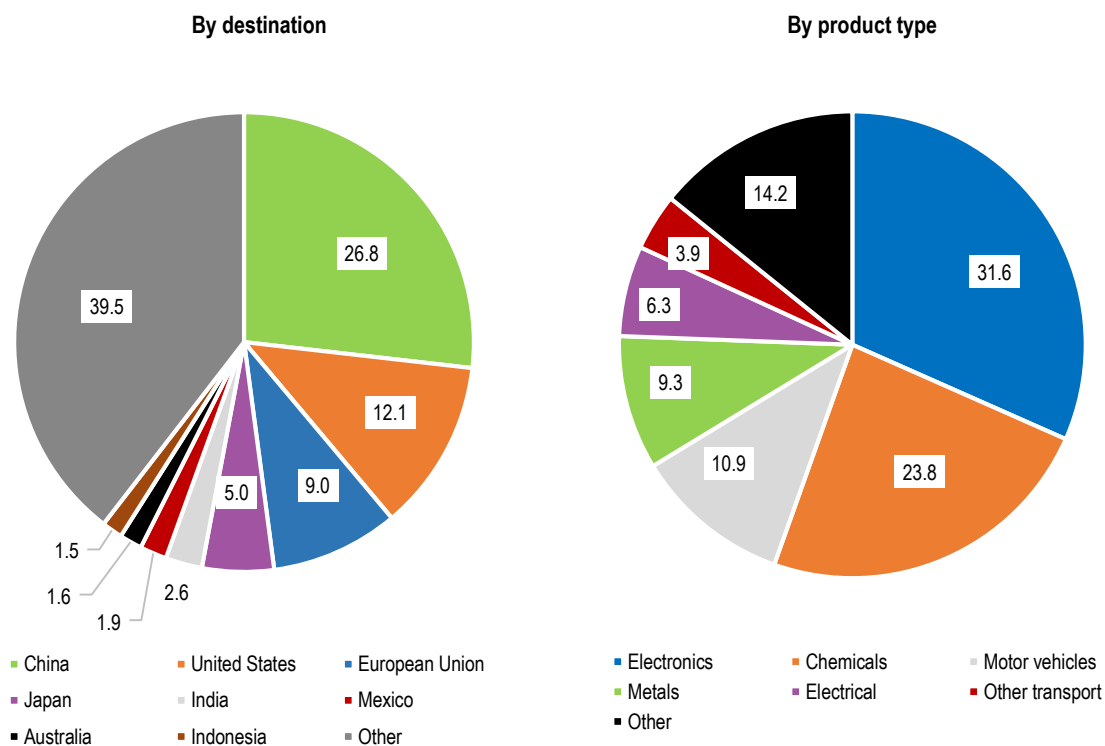
Source: OECD Quarterly International Trade Statistics; OECD Bilateral Trade in Goods by Industry and End-use (BTDIxE).

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Figure 1.5. The outlook for global semi-conductors remains uncertain
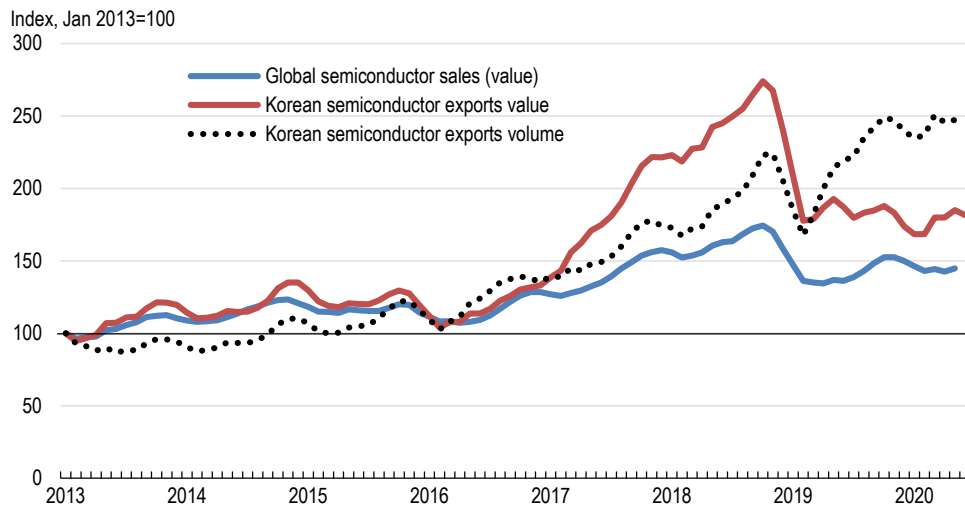
Source: World Semi-Conductors Statistics and Korea Customs Service.

Even though the economic downturn is milder than in other OECD countries and the government has taken extensive measures to support households and businesses (Table 1.1), the COVID-19 crisis creates new vulnerabilities. Household debt is relatively high and losses in income and rising unemployment will make reimbursement more difficult, although low interest rates help and further forbearance and debt deferral measures can be introduced if needed. Some households, notably self-employed, as well as some heavily indebted SMEs, already faced higher risks than ordinary homebuyers before the crisis (Bank of Korea, 2019a). The persistent concentration of economic power in the large business groups – the chaebols – may reduce the ability of the economy to adapt to an increasingly volatile global environment (2018 OECD Economic Survey of Korea).

Table 1.3. Events that could lead to major changes in the outlook

Vulnerability	Possible outcomes
A more protracted global depression than expected.	A very sluggish recovery from the COVID-19 crisis in trading partners would drag exports and investment down, with a major impact on Korean GDP growth.
The COVID-19 crisis could trigger further disruptions in global value chains and an intensification of global trade tensions. Korea is deeply integrated in global value chains.	Disruptions and related uncertainty in global value chains would affect both exports and investment. They could trigger a fall in the value of the won and capital outflows.
The deterioration in economic conditions associated with the COVID-19 crisis weakens the ability to repay of some heavily indebted households, notably self-employed and SMEs, despite broad-based government support.	The financial system is resilient, but some institutions may be vulnerable to large shocks, which could lead to credit contraction during the recession. Household distress would amplify the downturn, notably through a further reduction in consumption and employment.
Geo-political tension in the Korean peninsula intensifies further.	Although financial markets and capital flows have not been affected by the recent incidents, further escalation of tensions could create financial turbulence and weigh on economic growth and stability.

Monetary policy is accommodative but inflation remains below the 2% target

Inflation is undershooting its medium-term target (Figure 1.6), which prompted the Bank of Korea to cut its policy rate by 25 basis points already twice in 2019, in July and October to 1.25% (Figure 1.7, Panel A). The COVID-19 crisis brings further disinflationary pressures, to which the Bank of Korea responded swiftly by cutting its policy rate by 50 basis points and introducing a range of measures to provide liquidity and support financial markets in March 2020. The policy rate was cut further by 25 basis points to 0.5% in May 2020 (Table 1.1). The Won depreciated somewhat (Figure 1.7, Panel B). If low inflation and sluggish activity persist longer than expected, further monetary policy accommodation needs to be considered. Because little space is left for further policy rate cuts, the Bank of Korea should stand ready to adopt unconventional monetary policy measures going beyond liquidity support, like the purchase of government bonds to lower long-term interest rates.

Figure 1.6. Inflation is well below the 2% target
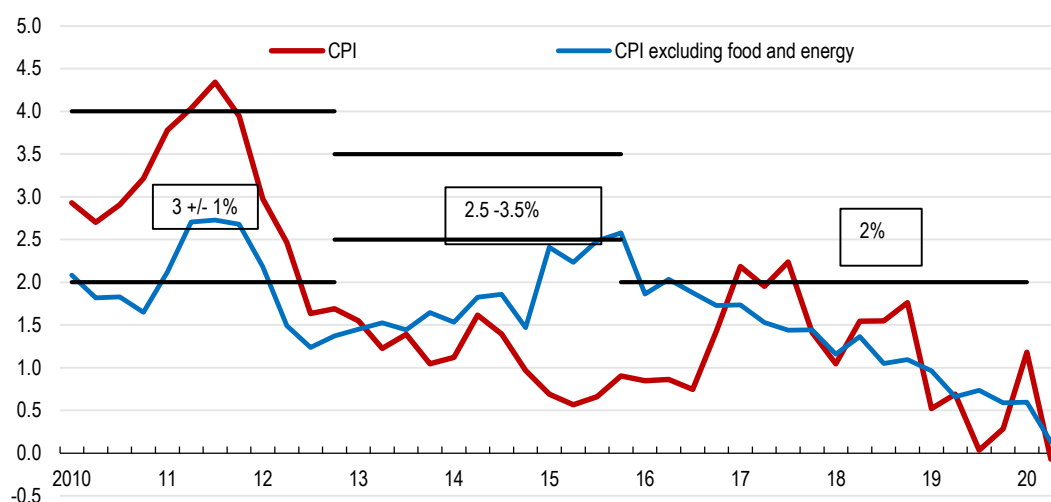
Note: In boxes, the medium-term consumer price inflation target.
Source: OECD, Economic Outlook Database.

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The Bank of Korea Act stipulates that "the Bank shall contribute to the sound development of the national economy through ensuring price stability, while giving due consideration to financial stability in carrying out its monetary policy" (Bank of Korea, 2019b). The inclusion of financial stability considerations in the central bank's mandate has merits, since monetary and macro-prudential policies can be complementary (Bruno et al., 2017). At the current juncture, economic growth is expected to be sluggish and inflationary pressures on the demand-side are forecast to remain weak due to the COVID-19 pandemic. Therefore, the Bank of Korea should maintain its accommodative monetary policy stance. Meanwhile, concerns about financial imbalance risks are intensifying as housing prices have been rising in an increasing number of areas, and lending to households has accelerated again recently under the accommodative financial conditions. The Bank of Korea should continue to pay close attention to changes in macroeconomic conditions and developments of the COVID-19 pandemic and financial stability risks, such as an over-concentration of capital in the real-estate market, while maintaining its accommodative policy stance to support the economy.

Figure 1.7. Monetary policy has been eased and the won has depreciated somewhat
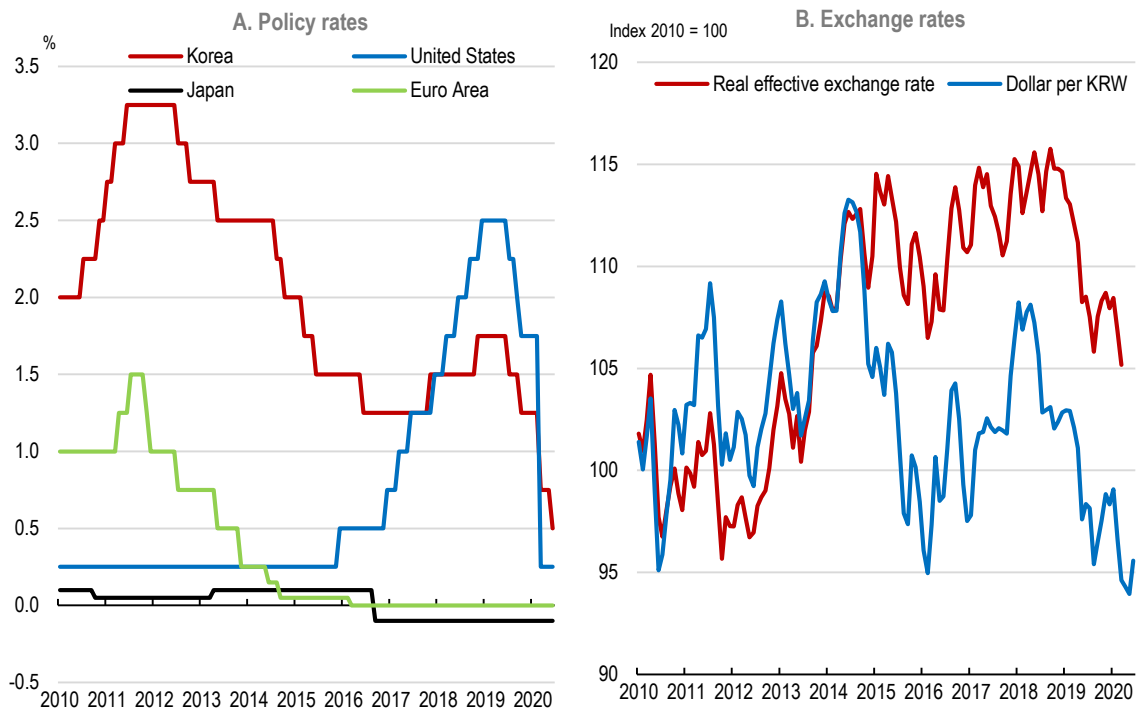
Source: OECD, Economic Outlook Database.

Strong public finances allow stimulating the economy

The government has appropriately responded to the COVID-19 crisis by providing additional fiscal support to the economy. The budget balance will move from a surplus of 0.9% of GDP in 2019 to a deficit of around 3% of GDP in 2020 (Figure 1.8, Panel A), reflecting in particular a fiscal stimulus of 3.1% of GDP. Government debt was less than 40% in 2019, lower than in all G7 countries and far below the OECD average of over 100% (Panel B). Sound public finances provide room to increase spending in the current downturn, even though the medium-term implications should be monitored carefully, especially when permanent spending measures are implemented. Temporary fiscal support should remain in place in the first phase of the recovery, before shifting towards more investment spending in the second phase. In the longer run, public spending is set to increase due to population ageing, which will require government revenue increases to ensure fiscal sustainability. Total tax revenue amounted to 28.4% of GDP in 2018, compared to an OECD average of 34.3% (OECD, 2019b), despite defence spending of over 2% of GDP, a share only surpassed in the OECD by Israel and the United States.

Figure 1.8. Sound public finances leave room for fiscal stimulus

A. Government fiscal balance

B. Gross government debt (National Accounts definition) 2019

Source: OECD, Economic Outlook Database.

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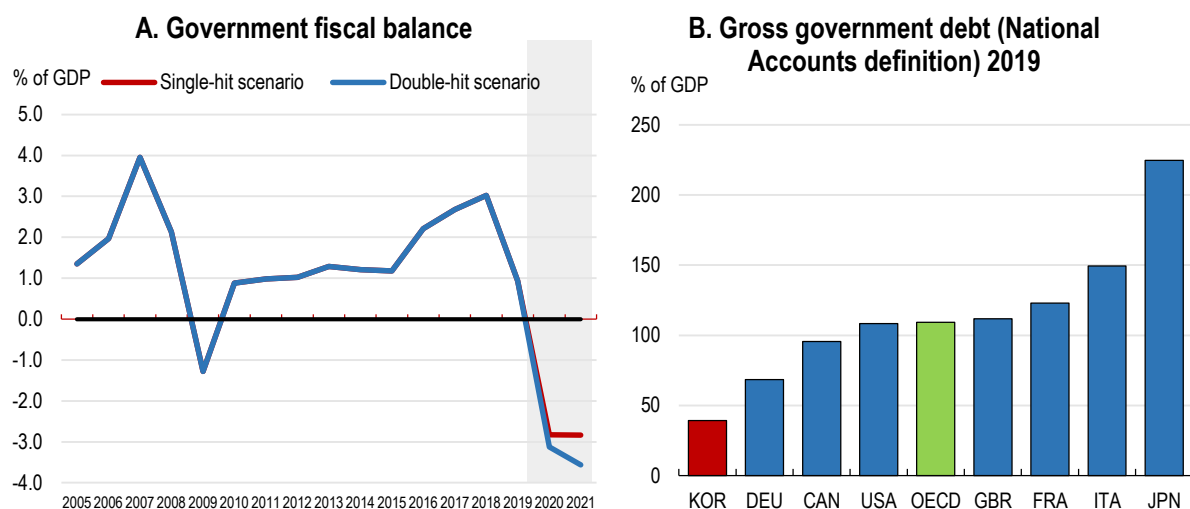
The decline in government revenue and massive fiscal support to the economy will push up government debt. At the current juncture, uncertainty is extremely high and any longer-term extrapolation is purely illustrative. Here, gross government debt is posited to increase through 2021 in line with the budget deficit, as projected in the event of a double-COVID-19 hit, with the deficit then assumed to be reduced gradually and to revert to its pre-crisis path by 2025. In that case, debt jumps to more than 48% of GDP in 2023 (Figure 1.9). Thereafter debt grows in parallel to its pre-crisis path, where the increase in spending due to ageing and increased demand for public services is derived from the OECD long-term model estimates (Guillemette et al., 2017).

Figure 1.9. Potential impact of the COVID-19 crisis on gross government debt
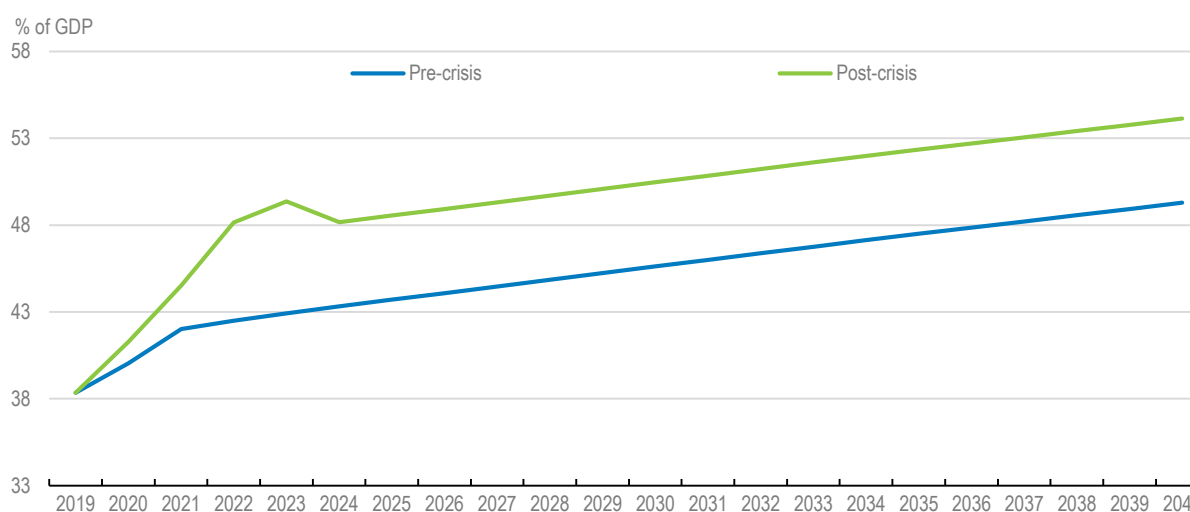
Note: This figure is based on the Economic Outlook 107 double-hit scenario updated to take into account incoming data through 23 July 2020. The increase in debt after 2021 in the pre-crisis scenario is driven by rising spending due to ageing and rising demand for public services, as derived from the OECD long-term model estimates (Guillemette et al., 2017).
Source: OECD calculations.

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Table 1.4. Past recommendations on fiscal policy

Main recent OECD recommendations	Action taken since the 2018 Survey or planned
Control spending in line with the Fiscal Management Plan to help ensure a sustainable fiscal balance in the long run.	The government set fiscal balance and government debt targets, and makes sure that total expenditure lies close to the target set out in the five-year National Fiscal Management Plan.
Allow public spending as a share of GDP to increase in the face of population ageing in the long run.	Government spending has been increasing much faster than nominal GDP since 2018.
Use taxes that are relatively less harmful to economic growth, notably the VAT, to finance rising social spending.	VAT is applied on cloud services provided by multinational companies in Korea since December 2018.
Reallocate public spending to social welfare as planned.	Public spending for health, welfare, and employment sector increased significantly (+11.3% in the 2019 budget).

The financial system remains solid, but the COVID-19 crisis raises vulnerability

The COVID-19 crisis generates liquidity risks, which are mitigated by the measures taken by the government and the Bank of Korea (Table 1.1). Some businesses in the sectors most affected by the pandemic are likely to suffer persistently low activity, which increases solvency risks, all the more as the crisis lingers. Regulatory Tier 1 capital is well above mandatory requirements albeit in the lower part of the OECD distribution (Figure 1.10, Panel A). Delinquency rates are low, even though they edged up for some regional banks already in the pre-crisis period for the self-employed, as business conditions deteriorated. The overall leverage ratio is close to the OECD average (Panel B). Corporate credit growth has been relatively strong (Figure 1.11, Panel A) and corporate debt relative to GDP is slightly higher than the G7 average, although somewhat lower than in Japan and the European Union (Panel B). Household credit growth slowed following the introduction of a debt service ratio limit in 2018 and a tightening of regulations for non-bank financial institutions since 2017, but remains higher than household income growth (Panel C). The ratio of household debt to disposable income is above the OECD average, but below levels reached in Northern Europe (Panel D).

Figure 1.10. The unweighted leverage ratio is close to the OECD average
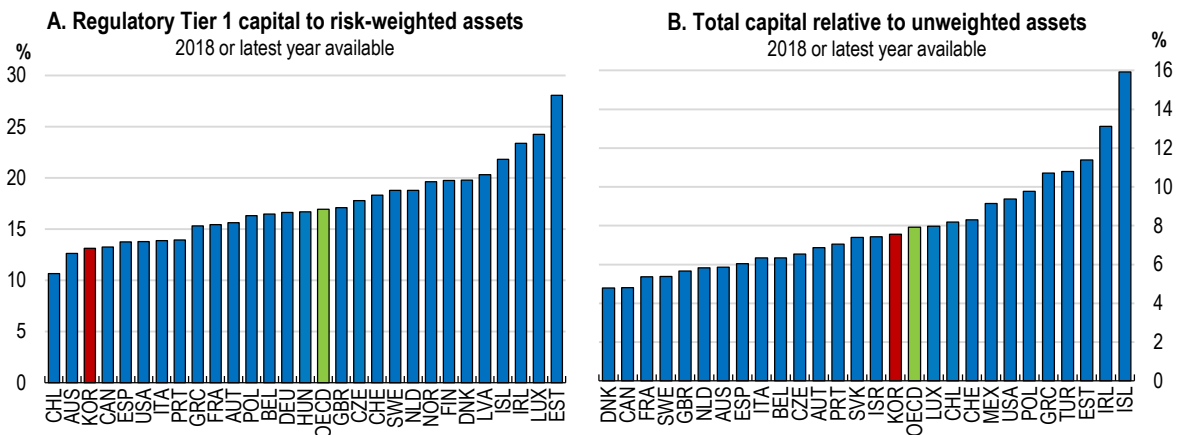
Source: OECD, Resilience database.

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Real housing prices have been stable at the national level over the past decade (Figure 1.12, Panel A), thanks to more responsive supply than in most OECD countries and prudent financial policy. The price-to-rent ratio is also close to its historical average (Panel B). Self-employed borrowers, however, are facing higher risks, notably in wholesale and retail trade, and in accommodation and restaurants, where the COVID-19 crisis has curtailed activity (Bank of Korea, 2019a). Moreover, housing prices in some parts of the Seoul metropolitan area and the provinces have increased. The government has recently announced additional measures to curb housing price increases, including tighter mortgage lending rules, higher capital gains tax rates, property tax increases for homeowners holding several dwellings, and regulatory revision to boost housing supply.

Korean finance has made efforts to become greener, for example through the issuance of green bonds and the commitment of several Korean companies to follow the Task Force on Climate-related Financial Disclosures (TCFD) recommendations. However, disclosure remains limited in Korea despite requirements from the 2012 Greenhouse Gas and Energy Target Management Scheme and the 2014 National Pension Act (Cambridge Centre for Sustainable Finance, 2018).

Figure 1.11. Aggregate corporate debt is moderate but rising and household debt is high

A. Corporate credit growth

Y-o-y % change

B. Non-financial corporation debt[1]

% of GDP

C. Household credit growth

Y-o-y % change

D. Household debt, % of household disposable income[1]

1. 2018 or latest year available.
Source: Bank of Korea, Bank for International Settlements and OECD, Economic Outlook Database.

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Figure 1.12. At the national level, housing prices have been stable

A. Real housing prices (1986Q1=100)

B. Price-to-rent ratio (1986-2019 average=100)
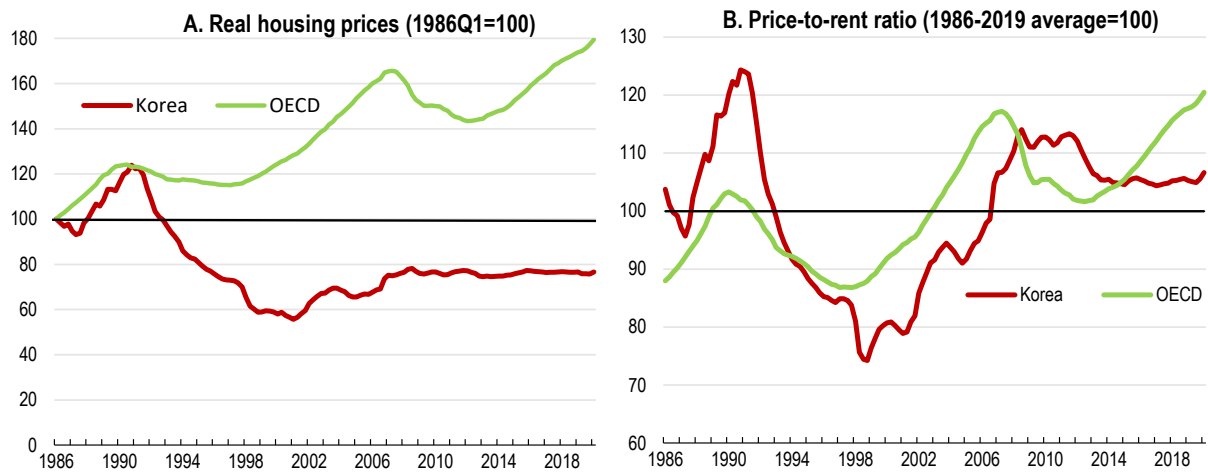
Note: In Panel A, real housing prices are deflated using the private consumption deflator.
Source: OECD, House Price database.

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Financial authorities need to consider taking into account climate-related risks in financial markets, as done for instance by the Bank of England (Carney, 2015). Climate events, such as droughts, generate aggregate supply shocks and depreciate assets. Decarbonisation has impacts on the asset prices of long-lived energy-related infrastructure. Because of market imperfections, financial markets will not on their own respond adequately to these risks (Krogstrup and Oman, 2019).

Table 1.5. Past recommendations on financial policy

Main recent OECD recommendations	Action taken since the 2018 Survey or planned
Consider further tightening loan-to-value (LTV) and debt-to-income (DTI) regulations on mortgage lending depending on the impact of the recent changes.	The cap on LTV was tightened to 0-40% for homebuyers to buy a house in "overheated" or "bubble-prone" areas, depending on the housing price. The cap was also tightened to 30-50% in the adjustment-targeted areas. Further regulations are imposed on a homeowner holding multiple houses in the regulated areas. The DSR (debt service ratio) regulation in the "overheated" or "bubble-prone" areas was tightened as well.

The Bank of Korea joined the Network for Greening the Financial System, a voluntary network of central banks promoting sustainable growth and joint management of climate change-related financial risks, in November 2019. The Network's recommendations are non-binding, but will help incorporate climate-related risks into financial stability monitoring and supervision (NGFS, 2019). Korea could consider following the United Kingdom, where the financial supervisor requires financial intermediaries to report their climate-related exposures since April 2019, or France, where the Law for the Energy Transition and Green Growth requires listed companies to disclose financial risks and institutional investors to report how investment policies align with the national energy and ecological transition.

The fruits of Korea's past economic performance have not been equally distributed

The COVID-19 crisis increases inequality, despite income support, job retention measures and the creation of public jobs for the elderly and other low-income groups. The duality of the Korean labour market – the large gap in wages, working conditions and social coverage between regular and non-regular workers – implies that non-regular workers, with insecure jobs and in many cases insufficient social insurance, are most vulnerable to shocks like the COVID-19 pandemic. Many older workers work in small businesses in the service sector particularly affected by the virus outbreak. In addition, physical distancing measures have tended to isolate them from work and social activities. Korea's relative poverty rate is the third highest OECD-wide, driven by the worst old-age relative poverty rate in the OECD, even though the country achieved one of the world's most impressive economic performances over the past half century, sometimes referred to as the "Miracle on the Han River" (Koen, 2019). While early phases of industrialisation generated strong income growth for most of the population, growth has become less inclusive since the 1997 financial crisis (Kim, 2011). Income inequality, as measured by the Gini coefficient after taxes and transfers, is the seventh highest in the OECD (Figure 1.13, Panel A), reflecting wide wage dispersion (Panel B) and limited redistribution, compared with most other OECD countries. Population ageing and skill-biased technological change threaten to increase inequality further unless labour market duality is reduced, skills are upgraded, older workers get access to better jobs, pension adequacy improves and the social safety net is strengthened.

The government has taken several measures in recent years to tackle income inequality. The minimum wage was raised by 16.4% in 2018, bringing it to a relatively high level in relation to the median wage (Figure 1.14). In 2019, the minimum wage was raised by 10.9%, the third highest increase in the OECD, behind Lithuania (38.8%) and Spain (22.3%). While the rapid increase contributed to reducing wage inequality, it may have affected the employment of low-skilled workers, as suggested by weakness in employment developments in labour-intensive sectors, even before the COVID-19 crisis, although weak demand has also contributed. SMEs are affected by higher labour costs, despite subsidies to help them adjust (Choi, 2018). Accordingly, the minimum wage was raised by 2.9% for 2020 and, in the context of the COVID-19 crisis, by 1.5% for 2021. The government has more than tripled the amount spent on the earned income tax credit (EITC) in 2019 and doubled the number of recipients, through lower qualification requirements and higher asset and income ceilings, allowing nearly one household in five to receive an EITC, with a total cost of around 0.2% of GDP. The EITC is an efficient tool to increase low-paid workers' income, especially in countries with high wage disparities (OECD, 2018a; Immervoll et al., 2007).

As shown above, non-regular workers have suffered much larger job losses than regular employees since the outbreak of the COVID-19 crisis, highlighting the need to strengthen the social safety net, both in crisis time, as is being done during the COVID-19 crisis (Table 1.1), and on a more permanent basis. Social protection remains weaker than in most other OECD countries, despite the gradual extension of Employment Insurance to most workers, as compliance remains insufficient, notably for non-regular and small company workers. Their rights should be better enforced. Employers that employ workers eligible for Employment Insurance, but fail to report their employees' insured status are subject to a fine for negligence. In 2018, a fine for failure to report workers eligible for the insurance was imposed in about 85 000 cases. Introducing a degree of statutory employer liability for all workers and a cash sickness benefit should also be considered, building on the crisis measures taken in the context of COVID-19. Employees who are (self-) quarantined or hospitalised due to COVID-19 are entitled to paid leave from the employer or living allowance from the government (Chapter 2). The New Deal includes a sickness benefit implementation study in 2021 and a pilot project for households, including low-income families, in 2022. Strong focus should be on rehabilitation and return to work, including clear protocols defining the rights and duties of workers, employers, doctors and insurance authorities, and regular work capacity assessments (OECD, 2018b).

Figure 1.13. Income inequality is relatively high

2017 or latest

A. Gini after taxes and transfers

B. Dispersion of gross earnings of full-time dependent employees
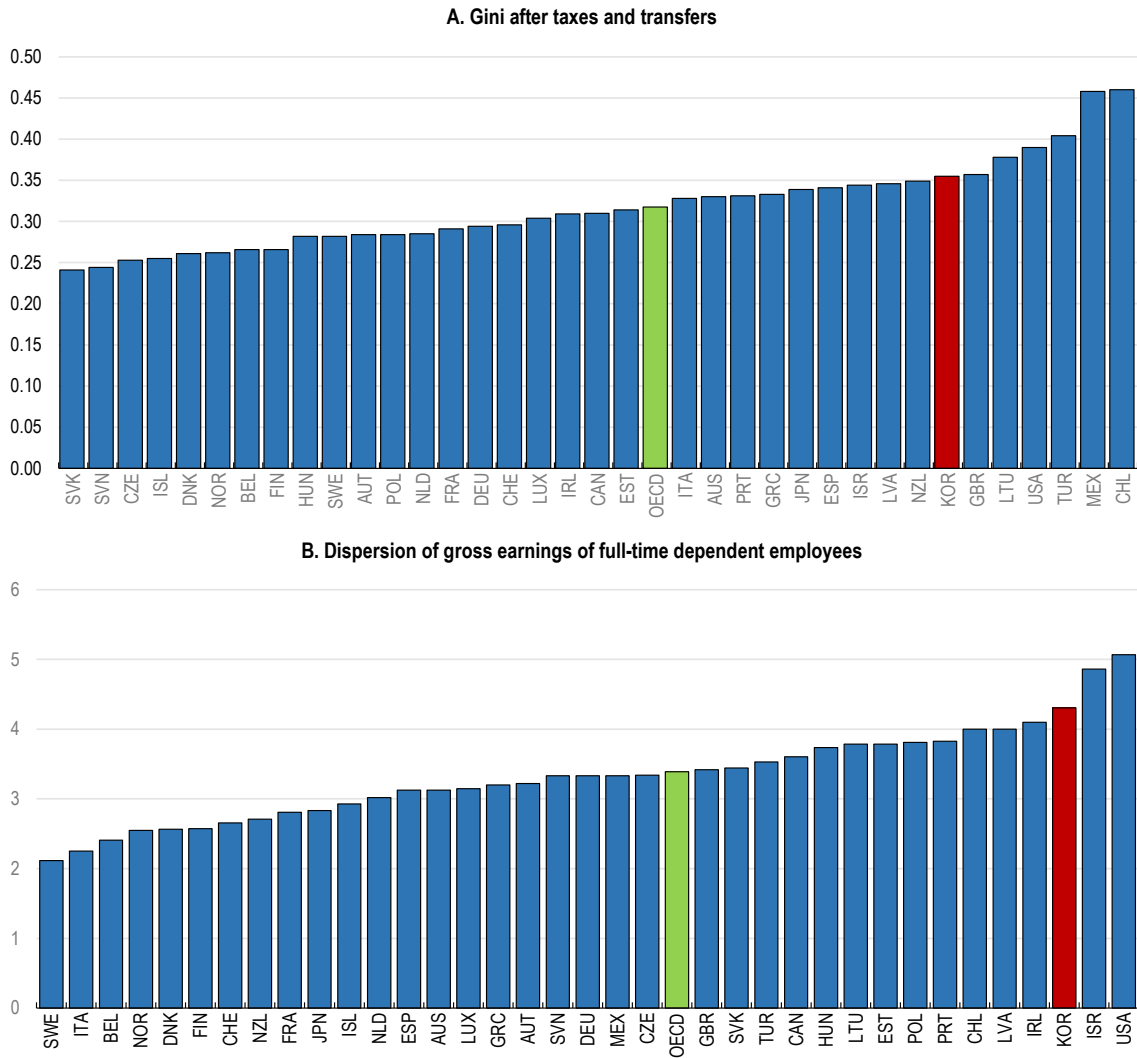
Note: Whole population. The Gini coefficient ranges from 0 (no inequality) to 1 (maximum inequality). The dispersion of gross earnings refers to the ratio of the top to the bottom decile of the wage distribution.
Source: OECD, Income Distribution Database and Decile ratios of gross earnings dataset.

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Figure 1.14. The minimum wage is high relative to the median wage, 2018
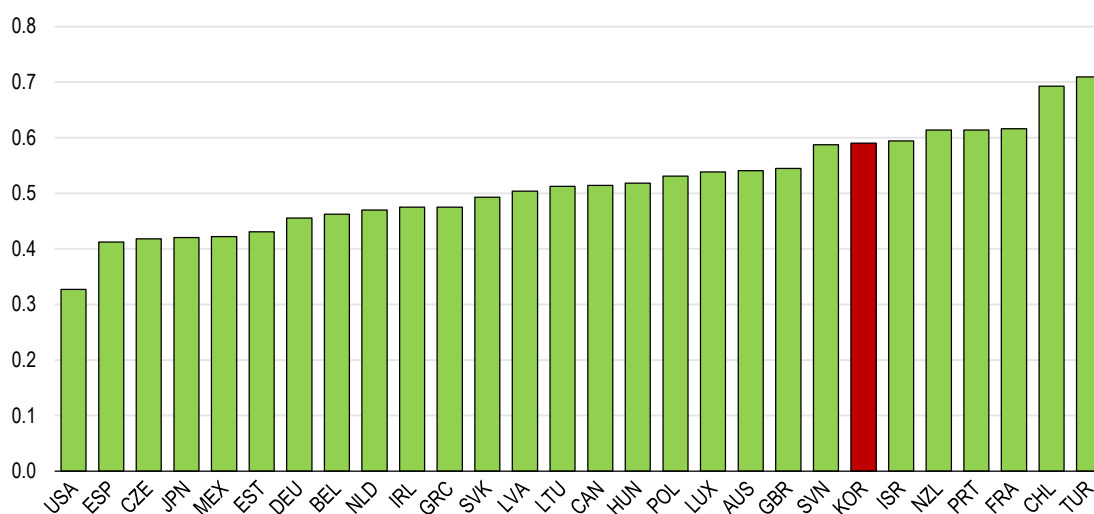
Note: Refers to gross wages.
Source: OECD, Minimum relative to average wages of full-time workers dataset.

Several other measures are being implemented to reduce inequalities, including extensions of social and health insurance coverage, the creation of public sector jobs, in particular for older workers, investments in vocational education, and increases in basic pensions. The pension system has yet to mature and means-tested support is low. The Basic Pension should be raised further and more focussed on the elderly in absolute poverty, access to the Basic Livelihood Security Programme should be facilitated and National Pension Scheme contributions and future replacement rates should be raised (Chapter 2). Late retirement is not preventing old-age poverty, as older workers tend to be employed in low-paid and insecure jobs (see below).

Lowering wage inequality will also require enhancing competition in product markets, as concentration and economic rents generally widen earning gaps between firms (Furman and Orszag, 2018). Employees in big business groups (chaebols) benefit from much higher wages and social protection than in SMEs (2018 OECD Economic Survey of Korea). Hence, reinforcing social protection should go hand in hand with loosening barriers to competition in product markets and labour mobility. Employment protection legislation is flexible regarding collective dismissals, but is relatively strict compared to other OECD countries regarding individual dismissals of regular workers (Figure 1.15). This contributes to labour market duality and hampers labour reallocation towards the most productive uses.

Table 1.6. Past recommendations on the labour market and inclusiveness

Main recent OECD recommendations	Action taken since the 2018 Survey or planned
Break down dualism by relaxing employment protection for regular workers and making it more transparent, while expanding social insurance coverage and training for non-regular workers.	The coverage of industrial accident compensation insurance is extended to apprentices from universities from September 2018, construction equipment operators (about 110 000 persons) from January 2019 and to visiting service workers and cargo truck drivers (about 199 000 persons) from July 2020. The government plans to expand the coverage of employment insurance to dependent self-employed and freelance artists. In 2020, the government will introduce the National Learning Card to integrate learning account systems for the unemployed and the employed.
Assess the impact of the 16.4% hike in the minimum wage in 2018 before raising it further.	Some studies show that raising the minimum wage has reduced wage inequality. Further studies on the impact on the employment are needed. The Minimum Wage Commission is studying ways to improve analyses and research on the effects of the minimum wage. The minimum wage increase was set to 2.9% in 2020 and 1.5% in 2021, taking into account prevailing economic conditions.
Increase the quality and availability of vocational education to reduce labour market mismatch and labour shortages in SMEs.	The number of specialised high schools participating in industry-academia apprenticeship partnerships has increased markedly and the government plans to develop training in Fourth Industrial Revolution sectors. Since 2014, 15 369 businesses and 91 195 workers have participated in the "(work-study) dual system".
Further increase the Basic Pension and focus it on the elderly in absolute poverty.	The government increased the Basic Pension for all beneficiaries (around 5 million) to up to KRW 250 thousand per month from KRW 200 thousand in September 2018. From April 2019, low-income elderlies (bottom 20%) receive an increased monthly basic pension of up to KRW 300 thousand.

Figure 1.15. Permanent workers' employment protection is relatively strong

Index of protection of permanent workers against individual dismissals, 2013
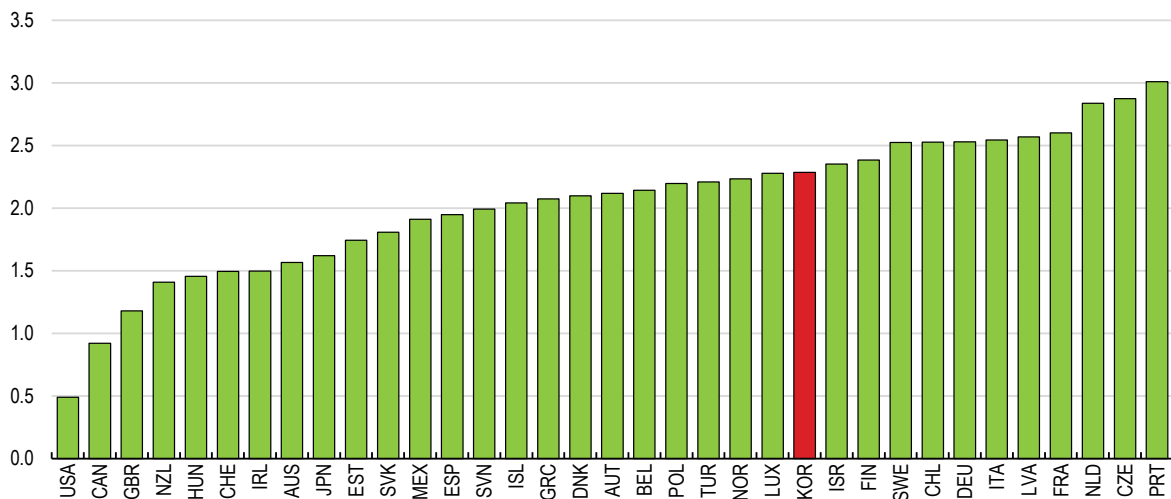
Note: The index ranges from 0 (no regulation) to 6 (detailed regulation).
Source: OECD, Employment Protection Database.

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Korea's economic achievements have not fully translated into well-being

Korea's income per capita has risen spectacularly over the past decades and is now close to the European Union average. However, looking at the well-being dimensions monitored by the OECD, Korea is among the top 20% OECD performers only on housing, although scores on education and skills, and civic engagement, are also fairly high (Figure 1.16). Korea ranks particularly low on social connections, perceived health status, environmental quality and work-life balance, highlighting the need to foster a more inclusive society. Meanwhile, the government submitted again the revision package of labour-related laws based on the recommendations of public interest members of the *Economic, Social and Labour Council*, together with the ratification proposal of the three International Labour Organization fundamental Conventions No. 87 on freedom of association, No. 98 on the right to organise and collective bargaining, and No. 29 on the prohibition of forced labour to the National Assembly. The approval by the National Assembly of the revision package and the ratification proposal would significantly improve Korea's worker fundamental rights.

Figure 1.16. Well-being scores remain relatively low in many dimensions

Better Life Index, country rankings from 1 (best) to 35 (worst), 2017
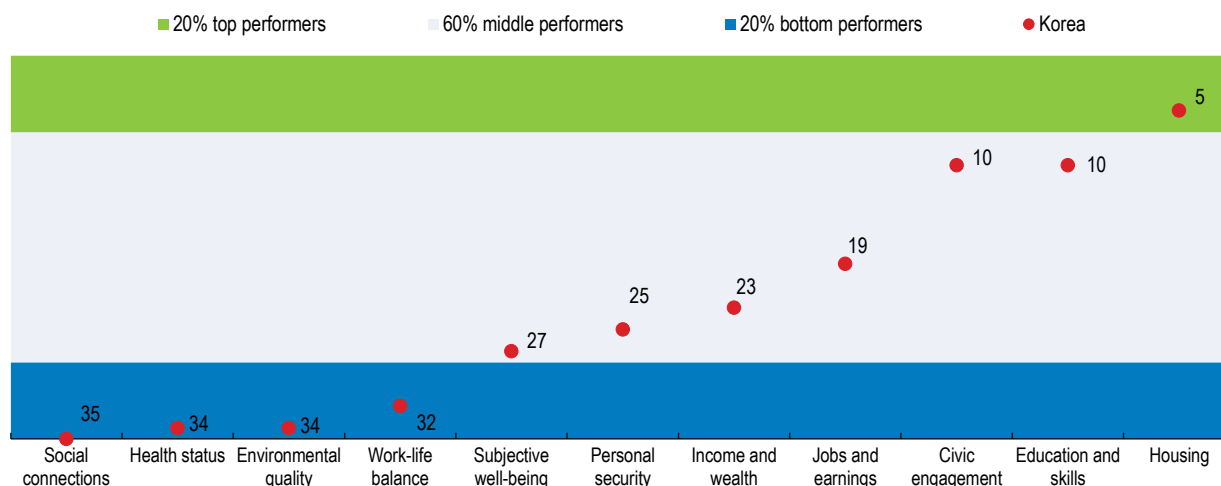
Note: Each well-being dimension is measured by one to four indicators from the OECD Better Life Index set. Normalised indicators are averaged with equal weights.
Source: OECD Better Life Index, www.oecdbetterlifeindex.org.

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Better use of labour resources and innovation can support growth

Korea's employment rate is relatively low, even before the COVID-19 crisis (Figure 1.17, Panel A), largely reflecting low female employment, although delayed labour market entry of youth also contributes. Employment of older workers is high, but often concentrated in low-paid, low productivity jobs. Working time is among the highest in the OECD, but labour productivity is low (Panel B), whether measured per employee or per hour worked, mostly reflecting weak performance in SMEs and services. Hence, policies should aim at raising employment and productivity, while promoting better work-life balance (Fernandez et al., 2020).

Figure 1.17. Korea has scope to raise both employment and productivity

2018 or latest

A. Employment rate, population aged 15-64 (%)

B. Labour productivity (OECD=100)

■ GDP per person employed   ◇ GDP per hour worked
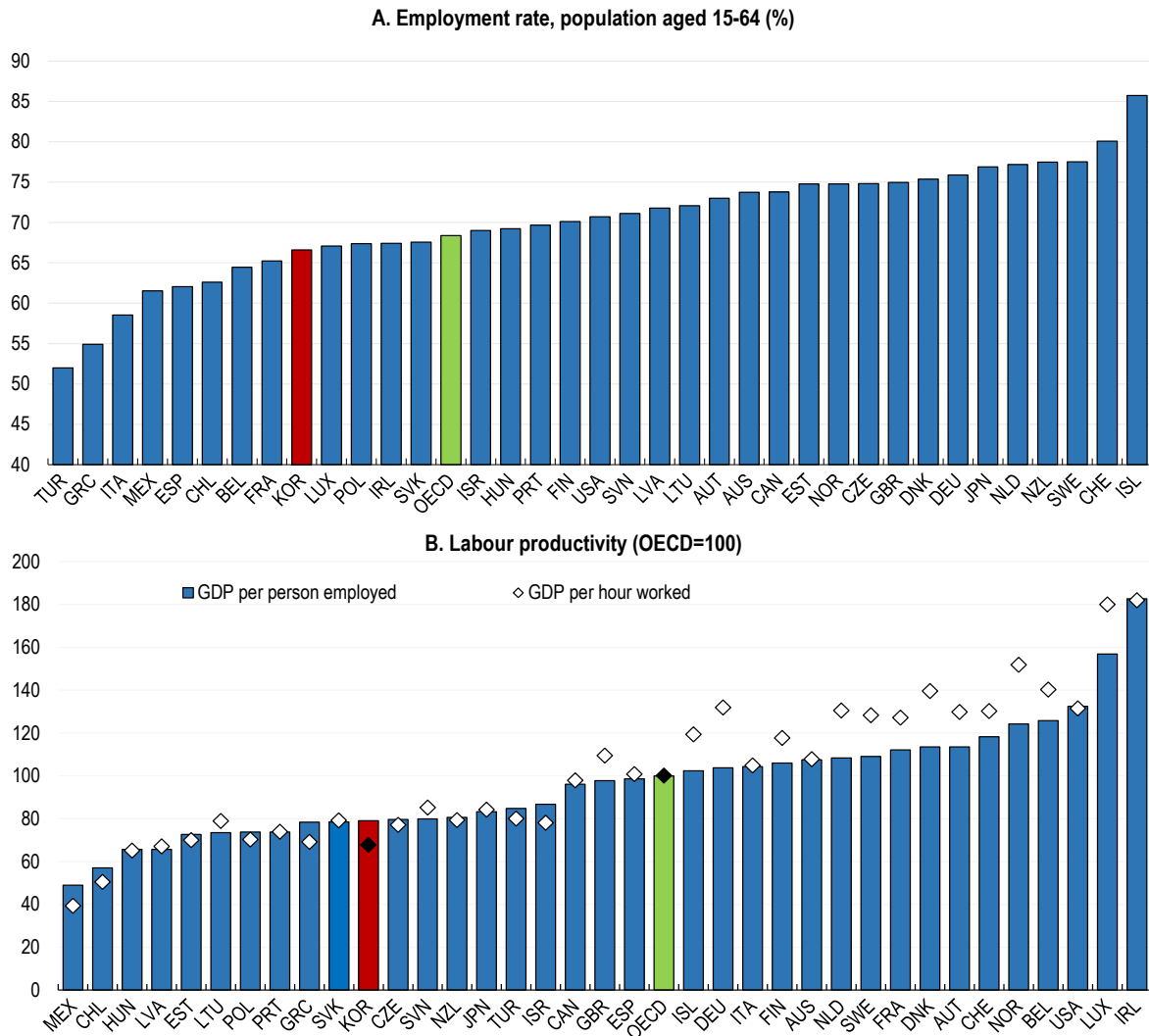
Source: OECD (2019c), *OECD Compendium of Productivity Indicators 2019*, OECD Publishing, Paris, https://doi.org/10.1787/b2774f97-en.

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Boosting female and youth employment, prolonging careers and enhancing adult skills is essential

The gender employment gap for people aged 15-64 is nearly 18 percentage points, the fourth largest in the OECD. Relatively low wages and weak career prospects discourage many women from working. Even when working, many women are in non-regular employment, which prevents them from making the most of their generally high level of qualification. This may contribute to the gender wage gap, which is the widest in the OECD, at about 34% in 2018, as against an OECD average of about 13%. A number of recent measures, in particular to enhance childcare quality, improve work-life balance and facilitate return to work after career breaks could help reduce the gender gap. More broadly, a culture of gender equality needs to be promoted in the workplace and at home. The take-up of parental leave is still low, especially for fathers (OECD, 2019d). Recent measures to extend paid maternity leave to groups of workers not previously

covered (self-employed and atypical workers) are welcome, but Korea should consider applying similar extensions to its paternity and parental leave entitlements. Introducing options to take parental leave for shorter periods at higher payment rates, as in Germany, could also help encourage take-up, especially by fathers. The gender wage gap should be addressed, for instance, by regularly publishing a national-level analysis of wage difference determinants to promote fairer wages. Gender-friendly policies could also have a positive impact on the fertility rate, which has fallen to around one, the lowest level in the OECD (Chapter 2).

Table 1.7. Past recommendations on promoting female employment

Main recent OECD recommendations	Action taken since the 2018 Survey or planned
Upgrade accreditation standards in early childhood education and care and make them mandatory.	From June 2019, the Assessment and Accreditation system is mandatory and applied to all day-care centres. To achieve a 40% share of public childcare by 2021, the government is expanding the number of public day care centres (574 in 2018 and 654 in 2019). From September 2019, residential compounds with 500 or more households are required to establish a public day care centre.
Raise qualification standards for teachers.	From March 2020, teachers at day-care centres with a long-term employment gap (two years or more) are required to receive preliminary job training. The government plans to introduce a system to enhance teachers' expertise.
Relax fee ceilings on private childcare institutions and entry barriers.	The government pays for the tuition for all children including in private childcare centres. A price ceiling applies for certain expenses such as field trips. The accreditation of public day-care centres, highly preferred by parents, is not restricted. The government implements policies to turn private daycare centres into public centres by signing lease agreements.

The elderly in Korea tend to work longer than in most other OECD countries for several reasons, including a still immature National Pension Scheme. After being forced to leave their career job at a relatively early age for various reasons, including poor business performance, business suspension and family care, Koreans tend to move to jobs with lower pay. This generates old-age poverty, lowers well-being and productivity, and encourages working long hours (Hijzen and Thewissen, 2020). Expanding incentives for workers and employers to ensure that workers stay longer in their career jobs, promoting more flexibility in wages, better work-life balance and lifelong learning could boost the level and quality of employment of older workers. The mandatory retirement age was raised to 60 in 2016-17 and should be reviewed to increase it further over time, as companies move away from the seniority-based wage system. This needs to be complemented by further investments in adult education and enhancing its governance, notably through better coordination between ministries and with regional authorities and other stakeholders (OECD, 2020a, b). More broadly, a gradual rebalancing of active labour market policy from direct job creation, which currently accounts for about half of spending, to training and job counselling will be necessary to enhance job quality and employability. Public employment service resources need to be increased, along with second-career guidance for mid-career and older workers. The contributions of youth and immigrants to the Korean economy could also be enhanced by speeding labour market entry through further developing vocational training and career guidance, and gradually adapting the job mobility system for foreign workers, while continuing to shield local workers from undue competition (Chapter 2).

Less than half of youth aged 15-29 were employed before the COVID-19 crisis, the fifth lowest share in the OECD, reflecting long studies, as more than two-thirds of youth obtain tertiary degrees, but also slow transition from education to employment. The crisis is exacerbating this problem, with youth employment having declined rapidly since February 2020, particularly in the service sector, and further contraction expected over the coming months (Han, 2020). Labour market duality encourages young people to extend formal or informal education in the hope of joining large firms or the public sector, rather than SMEs, which often suffer from a shortage of skilled workers. To address skills mismatches, the government has stepped

up career counselling, developed apprenticeships and vocational education (notably Meister schools) and introduced incentives for tertiary education institutions to propose more market-relevant degrees. Nevertheless, career guidance and counselling will need to be developed further, in particular through increased resources for the public employment service and stronger involvement of employers (Chapter 2).

Changing Korea's long working-hour culture requires more than lower legal working time limits

The current government is seeking to reduce the high incidence of very long working hours in an effort to improve job quality, health and productivity. Korean workers work a total of 1 967 hours per year, the third highest in the OECD and 300 hours longer than the OECD average (as of 2018). About 12% of workers work longer than 52 hours per week. Working very long hours increases the risk of burnout and work accidents, a major concern in Korea, promotes unhealthy lifestyles and undermines labour productivity (Saint-Martin et al., 2018).

A preliminary assessment of the ongoing working time reform to decrease the limit from 68 to 52 weekly working hours shows that this reduced the incidence of working more than 52 weekly hours by five percentage points or about a fifth of its pre-reform level among employees working overtime in large firms (Figure 1.18 Panel A). With the reform, Korea's statutory working time limits have become in line with dominant OECD practice (Figure 1.18 Panel B, Box 1.2). The current reform builds on a previous reform implemented between 2004 and 2011 that reduced the regular working week from 44 to 40 hours. While it is too early to tell whether the ongoing reform will improve labour market outcomes beyond actual hours worked, worker health, productivity and wellbeing, several evaluations credit the previous reform with positive outcomes like fewer work accidents, healthier lifestyles and enhanced labour productivity (Lee and Lee, 2016; Ahn, 2016; Park and Park, 2019). Strikingly, labour productivity not only increased in hourly terms but also on a per person basis, meaning that hourly productivity improved sufficiently to offset the decrease in the number of working hours.

Box 1.2. Working-time reforms in Korea

The current government is gradually implementing a working time reform with the following elements:

- The maximum number of total weekly working hours has been reduced from 68 to 52 by lowering the cap on overtime from 28 to 12. The new maximum applies to firms with 300 or more employees as of July 2018 and to firms with 50 or more employees as of January 2020 and will be extended to firms with five or more employees in July 2021, to give smaller firms more time to adjust. Firms with 5 to 29 employees are temporarily allowed an additional eight hours of overtime until December 2022, provided there is a written agreement with an employee representative.

- The number of sectors exempt from total hours limits has been reduced from 26 to 5 as of July 2018. Sectors such as consumer goods sales, hotels and restaurants and finance now have to abide by the maximum limit. Exemptions still apply to certain types of transportation services and healthcare.

- Firms will be obliged to offer the 15 public holidays as paid days off, or offer an alternative day off in agreement with an employee representative. Previously, firms were not obliged to provide (paid) leave on public holidays, although most larger firms did. This reform is also being implemented in a staggered fashion by firm size between 2020 and 2022.

A tripartite agreement was signed on a plan to extend the reference period of the flexible working hours system from three to six months, and a reform bill reflecting the agreement is currently pending at the National Assembly.

Source: Hijzen and Thewissen (2020).

Figure 1.18. Fewer individuals work very long hours as time limits were tightened towards OECD norms

A. Effect of the working time reform on the share of employees working overtime who work more than 52 weekly hours among firms with more than 300 employees

B. Legal maximum weekly working hours
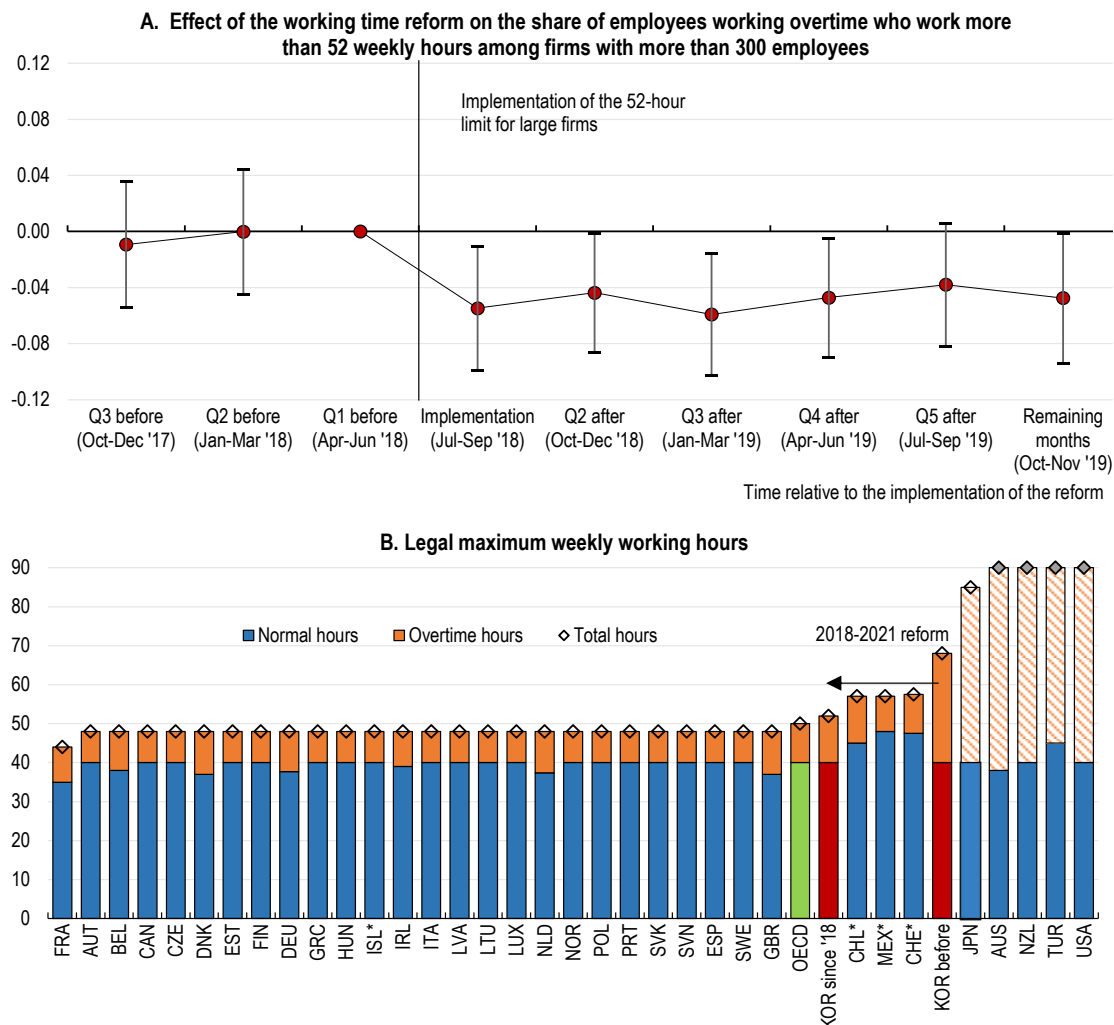
Note: Panel A illustrates the effect of the reform, by showing the difference in the difference in the incidence of working more than 52 hours between large firms affected by the reform (with 300 or more employees) and slightly smaller firms not yet affected (with 100-299 employees), relative to the quarter before the reform (April-June 2018). Vertical bands indicate the 95% confidence intervals of each point estimate. It shows that the probability to work more than 52 hours decreased by about five percentage points in affected firms since the implementation relative to the quarter before the implementation, compared to the change in probability over the same period in slightly smaller firms. The sample consists of employees aged 18 and older working overtime in a non-exempt private sector and non-exempt occupation on a permanent contract.

Panel B: Normal working hours are those not subject to overtime regulation. Overtime working hours are those where overtime regulation applies. Total working hours are the sum of normal and overtime working hours. Data refer to 2018 (2019 for Japan) or 2011-12 for the countries with an asterisk (2010 for Israel). Dashed bars and grey diamonds indicate that no legislative maximum exists. Korea before 2018 refers to the situation just before the reform, while after refers to the situation in 2021 when the reform will be fully implemented. In European countries with only maximum total (and not normal) working hours, common collectively agreed maxima are used for maximum normal working hours (Denmark, Germany, Iceland, Ireland, United Kingdom).

Source: Hijzen and Thewissen (2020), using Economically Active Population Survey micro data, Eurofound (2019), ILO Working Conditions Laws Database (2013) and the OECD Working Time Questionnaire (2010).

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While having more stringent working time limits is an important step in the right direction, more is needed to effectively change Korea's long working-hour culture. A first concern is that small firms with fewer than five employees as well as firms in some sectors (e.g. transportation and storage, health care) remain exempt from working time regulations. Second, incentives to supply and demand long working hours should be mitigated. Important supply factors include low skills, low wages and concerns about future pensions, and demand factors relate to limited flexibility for employers to adjust employment according to business conditions and productivity (Hijzen and Thewissen, 2020).

The diffusion of technology can boost productivity and well-being

Technology and digital tools offer vast opportunities to boost productivity (Chapter 3). The temporary lifting of the ban on telemedicine services during the COVID-19 crisis, which allowed patients to consult their doctors without risking mutual exposure to the virus, illustrates the benefits services based on new technologies can bring to the population (Box 1.3). Korea is one of the top players in emerging digital technologies (OECD, 2019e), with a large and growing ICT sector, outstanding digital infrastructure, almost generalised access to high-speed internet and the first nationwide introduction of 5G worldwide (OECD, 2017a; OECD, 2019f). However, while productivity is outstanding in ICT manufacturing and relatively high in other manufacturing, it is much weaker in services, including ICT services, which account for a large share of employment (Figure 1.19).

Box 1.3. Telemedicine: friend or foe?

Telemedicine is increasingly used across OECD countries, delivering health care in a wide range of specialties like neurology and psychiatry, using diverse techniques from remote monitoring to real-time video-consultations. Amid the COVID-19 outbreak, Korea has temporarily lifted its ban on telemedicine, allowing doctors to treat patients with mild symptoms on the phone. Between 24 February and 26 July, about 566 000 telemedicine bills were issued by 6 830 hospitals. While telemedicine helps limiting risks of infection between patients and doctors, it also meets high resistance among doctors who question the reliability of the diagnoses and data security.

Amid the COVID-19 outbreak, telemedicine services were made available in 23 other OECD countries. In Norway, the share of digital consultations in primary health care increased from 5% before the outbreak to 60% by March 2020. In the United States, teleconsultations increased from 6% to 50-70% of total consultations by March 2020 for some providers. In France, they increased from around 40 000 to almost 500 000 in March 2020. Evidence in other OECD countries (Germany, Luxembourg, the Netherlands and the Nordics) shows that health care can be tele-delivered in a safe and effective way, and can even lead to better outcomes than conventional face-to-face care, for instance for patients with diabetes or chronic heart conditions. It can also improve quality, timeliness, coordination and continuity of care, as well as knowledge sharing and reduced use of costly hospital care. Patients also tend to report high satisfaction and a sense of reassurance. Policymakers can encourage good practices of telemedicine through clear regulation and guidance, sustained financing and payment, and sound governance, in addition to appropriate training of both patients and health care professionals. They should also ensure telemedicine services are compatible with preserving patient safety and quality of care.

Source: Health Insurance Review and Assessment Service; OECD (2020c); Oliveira Hashiguchi (2020).

Figure 1.19. Low-productivity sectors account for a high share of total employment
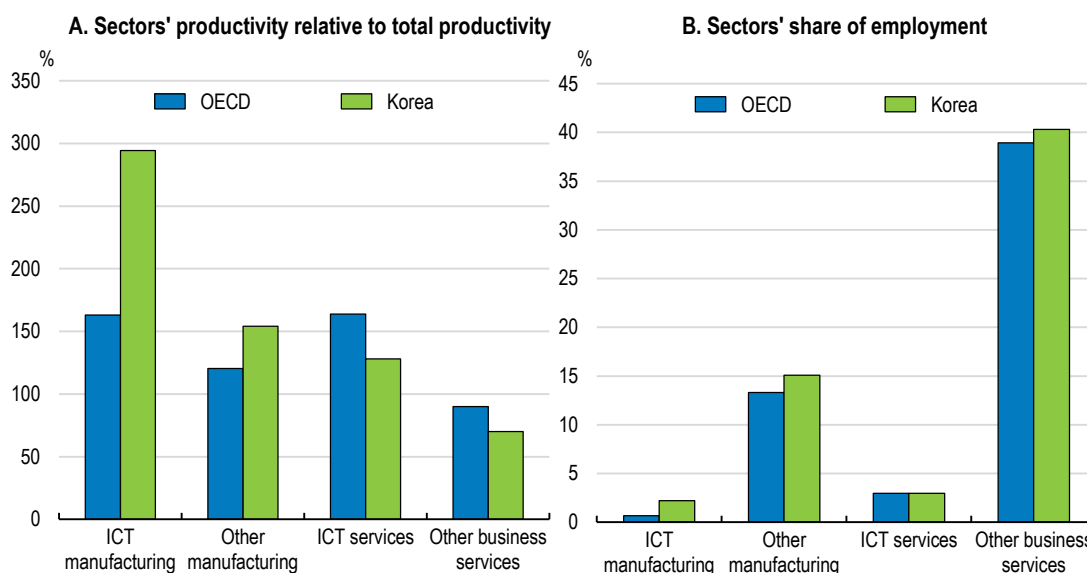
Note: Data refer to 2015. 'ICT manufacturing' includes manufacture of computer, electronic and optical products. 'ICT services' include publishing, telecommunication and IT services. 'Other business services' excludes the housing sector.
Source: OECD STAN Database.

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The diffusion of advanced digital technology is uneven (Figure 1.20). Korean firms have margins for improvement in the adoption of sophisticated digital technologies (Chapter 3). The lack of adequate skills and knowledge is the main barrier to the diffusion of digital technologies, especially in SMEs and among older workers. People lacking adequate digital skills are particularly disadvantaged as the COVID-19 pandemic has encouraged the "untact", or contactless, economy, with remote work and many services provided via on-line platforms to limit physical contact. SME employees have limited access to training (OECD, 2020c). The digital skills gap between generations is the highest among OECD countries and exacerbates social inequality. Teachers are key to ensure students develop digital skills, but most teachers feel they are not sufficiently prepared for the use of ICT for teaching. Improving access to and quality of training for SME employees, older workers and teachers is necessary to allow them to adapt to more digitalised production systems and raise managers' awareness of the potential of digital technologies. Promoting further collaboration between innovative companies, especially between SMEs and large enterprises, would facilitate the diffusion of digital technology, for instance through an open collaborative network to design new products and services, and exchange data (Fourth Industrial Revolution Committee, 2019). Amid the COVID-19 outbreak, Korea contained the spread of the virus, using advanced digital tools based on artificial intelligence and mobile apps, as well as remote access to daily life services (e.g. telework, online classes, e-commerce and telemedicine). The Korean authorities recently announced a *Korean New deal* to revive the economy, by facilitating the convergence of new and old industries through enhanced use of digitalisation. The *New deal* focusses on projects exploiting synergies between the government and the business sector, including strengthening data infrastructures, expanding data collection and usage, establishing 5G network infrastructure early and developing artificial intelligence. The *New Deal* also includes measures aimed at greening the economy and reinforcing the social safety net (Table 1.8). Building on the success of Korea's COVID-19 containment strategy, a "K-quarantine model" will be systemised and exported.

Table 1.8. Overview of the Korean New Deal projects

Type	Field	Project	Target	Budget (2020-25, KRW trillion)	Job creation
Digital New Deal	Data, Network, AI (D.N.A) ecosystem	1. Open data systems related to people's lives 2. Diffusion of 5G and AI to all industries 3. Smart government based on 5G and AI 4. Korean-style cyber-security system	Create data markets worth KRW 43 trillion in 2025 Increase the number of AI enterprises to 150 in 2025 from 56 in 2020	6.4 14.8 9.7 1.0	295 000 172 000 91 000 9 000
	Digitalisation of education infrastructure	5. Extend digital education infrastructure to all schools 6. Strengthen online education for universities and vocational training institutions	Increase Wifi coverage to all schools by 2022 Build a digital education platform using big data	0.3 0.5	4 000 5 000
	"Untact" (non-face-to-face) industries	7. Smart medical and care infrastructure 8. Diffusion of remote work culture in SMEs 9. Support online business of SMEs	Build 18 smart hospitals equipped with 5G and IoT Increase the share of remote work to up to 40%	0.4 0.7 1.0	5 000 9 000 120 000
	Digitalisation of social overhead capital	10. Establish a digital management system for core social overhead capital (e.g. transport and water networks) 11. Digital transformation of urban and industrial complex spaces 12. Establish smart logistics systems	Install intelligent transport systems for major expressways and railroads Install disaster warning systems in risk areas	8.5 1.2 0.3	124 000 14 000 55 000
Green New Deal	Green transformation of city, space and living infrastructure	13. Build zero-energy public facilities 14. Restore land, ocean and urban ecosystems 15. Establish a clean and safe water management system	Eco-friendly remodelling of 225 000 public rental units Create 723 hectares of urban forests to reduce fine dust levels	6.2 2.5 3.4	243 000 105 000 39 000
	Diffusion of low carbon and renewable energy	16. Build an energy-efficient intelligent smart grid 17. Lay the foundations to support the transition towards renewable energy 18. Expand green mobility such as electric vehicles and hydrogen fuel cell cars	Extend the use of smart grids to cover 5 million households Raise the number of electric and hydrogen cars to 1 130 000 and 200 000, respectively	2.0 9.2 13.1	20 000 38 000 151 000
	Innovative ecosystem of green industries	19. Foster leading green companies and create low-carbon and green industrial complexes 20. Create green innovation infrastructure such as R&D and finance	Transform 1 750 factories into clean factories Construct 10 smart energy platforms	3.6 2.7	47 000 16 000
Social safety net reinforcement	Employment and social safety net	21. Extend the employment safety net to most employees (e.g. employment insurance, industrial accident compensation insurance) 22. Reinforce the social safety net (Basic Livelihood Security Programme, sickness benefit) 23. Strengthen assistance for the unemployed (e.g. Job search allowance, vocational training) 24. Strengthen assistance to enter the job market 25. Strengthen industrial and work environment safety	Increase the number of beneficiaries of Employment Insurance to up to 21 million Extend Basic Livelihood Security Programme benefits to an additional 1.13 million households	3.2 10.4 7.2 1.2 0.6	- - 39 000 118 000 2 000
	Human resources	26. Foster digital and green talents 27. Reorganise the vocational training system 28. Strengthen digital access in rural areas and for vulnerable groups	Internet access in all rural areas 70% of the elderly aged 70 and over will enjoy mobile internet	1.1 2.3 0.6	25 000 126 000 29 000
Total				114.1	1 901 000

The government supports R&D through the Korea Small Business Innovation Research (KOSBIR) programme and R&D grants to SMEs, which have contributed to lift corporate R&D investment, registration of intellectual property rights and investment in tangible and human capital. Nevertheless, results in terms of creation of value added and commercialisation have been disappointing (Lee and Jo, 2018; Yang, 2018). Support programmes should be reviewed and innovation vouchers should be introduced to better direct R&D subsidies towards innovative SMEs, in manufacturing and in services, and boost their productivity. Providing SMEs with innovation vouchers would encourage them to engage in innovative projects, for instance by purchasing studies from universities and research institutions assessing the potential for new technology introduction to raise their productivity (Kim et al., 2018).

Rapid technological development entails challenges like cyber-security, which is crucial to ensure trust in economic transactions and well-being. Korea has the second highest share of internet users experiencing privacy violations in the OECD, after Chile (OECD, 2019e) and youth aged 10-29 are at much higher risk of internet or smartphone addiction than other age categories. This calls for reinforcing ICT education at schools and in firms to raise awareness of digital dangers, such as cyberbullying, privacy violation and addiction to ICT technologies.

Figure 1.20. Digital gaps between large and small firms remain high

Percentage of enterprises with ten or more employees using selected digital tools, 2018 or latest year
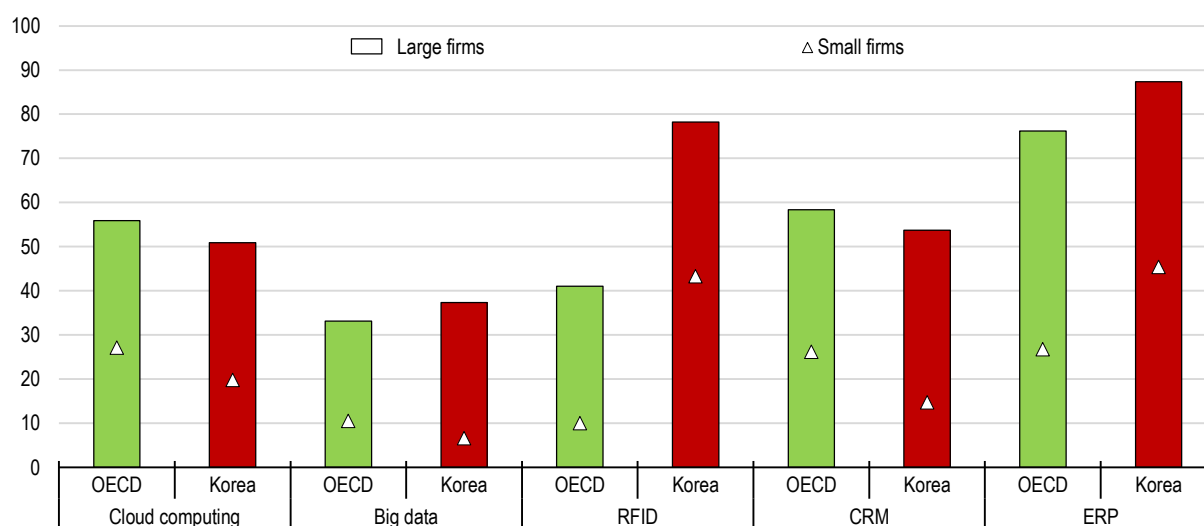
Note: RFID stands for Radio frequency identification; CRM for Customer relationship management; ERP for Enterprise resource planning.
Source: OECD (2019f); OECD ICT Access and Usage by Businesses Database.

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Product market regulations are among the most stringent in the OECD (Figure 1.21). Reducing these regulatory barriers to competition and reallocation, as well as providing easier financing for young innovative firms, can boost the diffusion of digital tools like cloud computing and artificial intelligence and maximise their impact on productivity (Sorbe et al., 2019). A programme to shift the burden of proof from the regulated to the regulator established in 2019 has led to the overhaul of around two thousand regulations. In 2020, the scope of the programme is being expanded, with priority given to areas related to the response to the COVID-19 and other crises. The administration is to be more proactive in reviewing regulations to solve the regulatory difficulties faced by the private sector, conflict resolution is to be improved and the programme is to be expanded to local government and public institutions. Further

participation of stakeholders in the programme is to be facilitated. The government has also introduced regulatory sandboxes to allow firms in new technologies and new industries to test their products and business models without being subject to all existing legal requirements. Follow up on this strategy should allow identifying regulation breaches and reviewing regulations, notably in the case of telemedicine.

Figure 1.21. Product market regulations are stringent
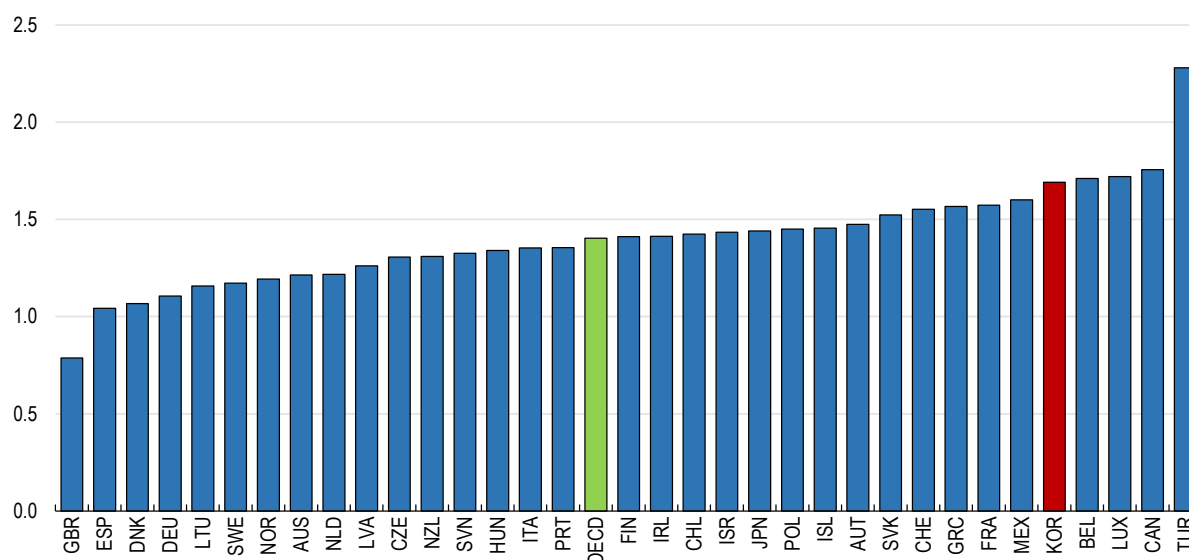
Source: OECD 2018 PMR database.

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Table 1.9. Past recommendations on regulation and support for SMEs and innovation

Main recent OECD recommendations	Action taken since the 2018 Survey or planned
Strengthen product market competition by relaxing barriers to imports and inward foreign direct investment and liberalising product market regulation.	The government seeks to incentivise foreign investment by revising the Foreign Investment Promotion Act to expand cash grants for high-tech and product investment.
Introduce a comprehensive negative-list regulatory system and allow firms in new technologies and new industries to test their products and business models without being subject to all existing legal requirements (i.e. a regulatory sandbox).	The government has launched regulatory sandboxes in ICT convergence, industrial convergence, financial innovation and regional innovation since January 2019. In 2019, 195 projects were approved by the regulatory sandbox system.
Increase lending based on firms' technology by expanding public institutions that provide technological analysis to private lending institutions.	Lending based on firms' technology amounted to KRW 205 trillion in 2019, up from KRW 163 trillion for 2018 and from KRW 128 trillion in 2017. The banks plan to improve their capacity to lend based on firms' technology by securing experts, developing assessment models and enhancing credit rating systems.
Ensure that support provided to SMEs improves their productivity by carefully monitoring their performance and introducing a graduation system.	The government is monitoring SME support policies and analysing their results to improve their effectiveness and financial efficiency.

The fight against corruption has been stepped up but challenges remain

The Korean government has taken significant steps to fight corruption recently. However, corruption still remains in Korean society, with relatively low scores both on the Transparency International Corruption Perception Index and the World Bank Control of corruption indicator, even though both have improved over the past three years (Figure 1.22). Korea's rankings on the Index of Public Integrity, developed by the European Research Centre for Anti-Corruption and State-Building with support of the European Union, and the TRACE Bribery Risk Matrix, developed by TRACE International in collaboration with the RAND Corporation, have also improved. Corruption of low-level public officials has been almost eradicated, in particular thanks to the establishment of the Korean Independent Commission Against Corruption (KICAC) in 2002, which was integrated in a broader agency, the Anti-Corruption and Civil Rights Commission (ACRC) in 2008.

Figure 1.22. Corruption is perceived as relatively high
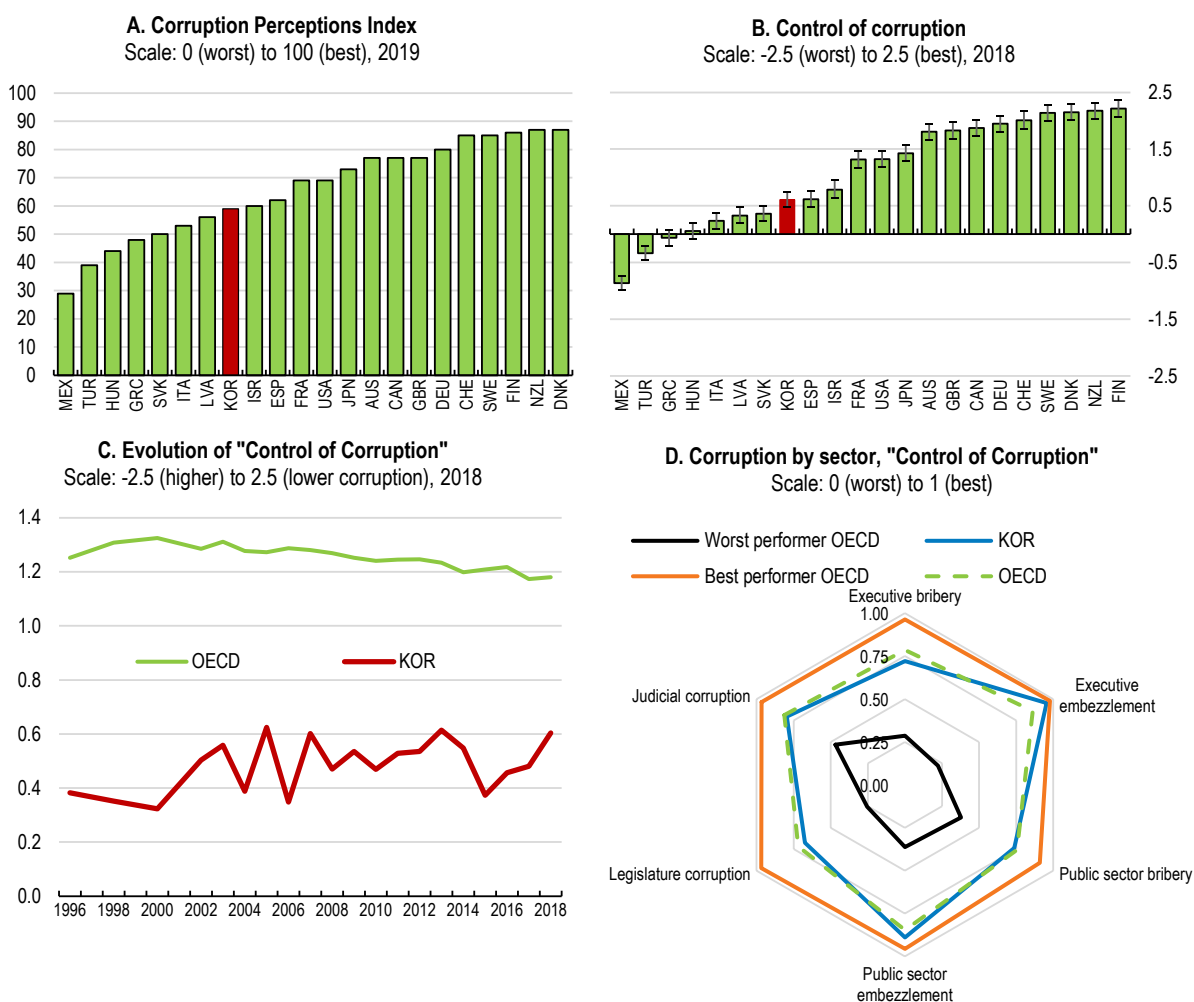
Note: Panel B shows the point estimate and the margin of error. Panel D shows sector-based subcomponents of the "Control of Corruption" indicator by the Varieties of Democracy Project.
Source: World Bank; Transparency International; Varieties of Democracy Institute; University of Gothenburg, and University of Notre Dame.

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High-level corruption involving politicians and top private company executives remains problematic, as illustrated by a number of high-profile cases in recent years. Also here, significant progress has been made on some issues. An amendment to the Prevention of Corruption and the Establishment and Management of the ACRC, which came into force in October 2019, reinforces the protection of whistleblowers, by severely punishing retaliatory measures (e.g. dismissal). The Public Finance Recovery Act, which came into force on 1st January 2020 aims at recovering illegitimate profits derived from abusive claims for public funds (subsidies, compensation and contributions), which amount to an estimated KRW 214 trillion (about $ 180 billion or 11% of annual GDP). New provisions were added to the Code of Conduct of Public Officials to prevent conflicts of interest. Recently, a number presidential pardons were denied to politicians, business executives or public officials involved in corruption. In late December 2019, the National Assembly passed a bill to set up a special anti-corruption investigation unit tasked with looking into wrongdoing by high-ranking government officials, which includes senior prosecutors, judges and police officers.

Korea's OECD Anti-Bribery Convention enforcement record has declined between the 2011 and 2018 assessments. Coordination mechanisms between Korea's police and prosecutors' offices and reporting requirements of suspected bribery to relevant law enforcement agencies need to be clarified. Nevertheless, high tax transparency helps fight corruption (Figure 1.23).

Figure 1.23. Korea is compliant on tax transparency

Exchange of Information on Request
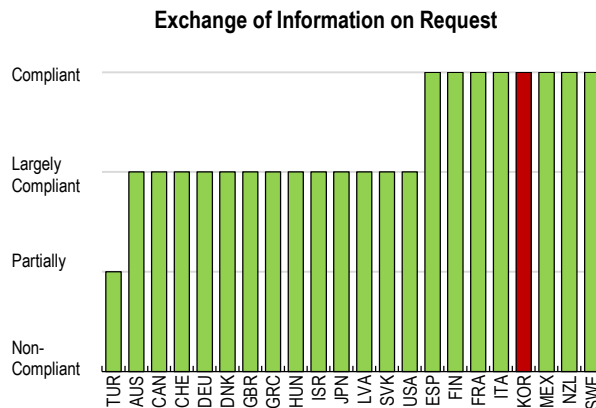
Note: The graph summarises the overall assessment on the exchange of information in practice from peer reviews by the Global Forum on Transparency and Exchange of Information for Tax Purposes. Peer reviews assess member jurisdictions' ability to ensure the transparency of their legal entities and arrangements and to co-operate with other tax administrations in accordance with the internationally agreed standard. The figure shows first-round results; a second round is ongoing.
Source: OECD Secretariat's own calculation based on the materials from the Global Forum on Transparency and Exchange of Information for Tax Purposes, OECD, and Financial Action Task Force (FATF).

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Table 1.10. Past recommendations on corruption

Main recent OECD recommendations	Action taken since the 2018 Survey or planned
Follow through on the government's pledge to not grant presidential pardons to business executives convicted of corruption.	Under the Moon Administration, group presidential pardons were granted only twice, and did not concern politicians, business executives or public officials involved in corruption.

Environmental quality remains low by OECD standards

Rapid industrial growth over decades has taken its toll on the environment and a shift towards greener growth is essential to reduce greenhouse gas emissions (GHG) and improve the population's living environment, not least air quality (OECD, 2017b). In recent years, CO_2 and energy intensity have fallen only slightly, and low oil prices in the wake of the COVID-19 crisis may generate further headwinds to the energy transition. The share of renewables in primary energy supply remains modest (Figure 1.24, Panels A-C). Renewables contribute 8.3% to the country's electricity generation, one of the lowest shares OECD-wide. Fossil fuels account for 80% of primary energy supply, of which coal represents 31%, more than in most other OECD countries (Panel D). Nuclear accounts for 10.5% of primary energy supply and 23.4% of electricity generation, but is to be phased out by 2083.

Notwithstanding a temporary improvement during the first half of 2020, with the positive effects of the seasonal fine dust control system, favourable weather conditions, and the COVID-19 crisis that depressed activity, most of the population is exposed to small particle air pollution well above the critical threshold of the World Health Organisation (10 µg/m³; Panel E). Small particle concentration in Seoul is about twice the WHO ceiling (Trnka, 2020), raising premature mortality substantially (Roy and Braathen, 2017) and affecting children's health most (World Health Organization, 2018). Education outcomes for young children attending schools exposed to higher air pollution are substantially and lastingly lower (Heissel et al., 2019). Moreover, air pollution likely worsens the impact of the pandemic (UBC, 2020). About half of the total level of fine particles stem from domestic sources, notably industry, power plants and diesel vehicles. The remainder comes from neighbouring countries. Korea has signed a number of bilateral agreements to address the fine dust issue with China since 1993, which have led in particular to cooperation on demonstration projects, research and information sharing (Jung, 2019; OECD, 2019g). One of the main tasks of Korea's National Council on Climate and Air Quality (NCCA), an independent body launched in April 2019, is to reinforce cooperation with neighbouring countries to tackle air pollution and climate change. In 2019, air pollution was declared a "social disaster", which allows the release of emergency funds, and KRW 1.3 trillion (about 0.1% of GDP) extra funding was allocated to anti-pollution measures, in addition to the KRW 2.0 trillion (about 0.1% of GDP) main budget dedicated to anti-pollution measures. Measures include subsidies for replacing old diesel cars and buying air purifiers, as well as support for renewables. Public transport is being developed further, notably in the capital area. The government is implementing additional measures, including shutting down coal power plants, with the aim of reducing locally-generated small particle air pollution ($PM_{2.5}$) by 35% by 2024 relative to 2016, but sustained efforts will be required to reduce exposure to below the WHO limit.

The government has committed to reducing GHG emissions by 37% relative to business-as-usual by 2030 – equivalent to about 20% relative to the 2010 level. Worldwide, containing global warming will require moving to net zero GHG emissions in the long run (Intergovernmental Panel on Climate Change, 2018). An increasing number of high-income countries, have announced net zero GHG production-based emission targets for 2050 or earlier, including Belgium, Denmark, France, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom. Research suggests that reaching net zero emissions, while requiring broad and deep economic transformations, may have modest overall social costs (1-2% of GDP), which would at least in part be offset by well-being gains, in particular from lasting reductions in air pollution (UK Committee on Climate Change, 2019; OECD, 2019h).

Reaching Korea's emission targets will require substantial policy measures (OECD, 2017b). The strategy will need to tackle a broad range of sectors, including electricity generation, buildings, transport, industry and agriculture. Investment in energy efficiency is also essential to keep costs low (IEA, 2018). Decarbonisation of electricity is key, as switching to electricity in energy end-use is a major way to lower emissions. The government's pledge not to build new coal power plants is welcome. Four ageing coal power plants were closed recently and six will be closed soon, and others converted to cleaner resources. Phasing out coal altogether by 2030 would be in line with the commitments of countries in the Powering

Past Coal Alliance (2017), which argues that ending unabated coal use by 2030 would be a cost-effective way to align policies with the Paris Agreement. The government's goal is raising the share of renewables in electricity generation from about 8.3% in 2018 to 20% by 2030 and 30-35% by 2040. Part of the fiscal stimulus in the wake of the COVID-19 crisis ought to be oriented towards speeding up the energy transition. This is all the more important insofar as digitalisation may increase electricity consumption.

Figure 1.24. Environmental performance remains weak

A. CO_2 intensity

B. Energy intensity

C. Renewable energy share

D. Energy supply by source, 2017[1]

E. Population exposure to $PM_{2.5}$

F. Environment-related taxes
% of GDP

G. CO_2 emissions priced above EUR60
% of total CO_2 emissions from energy use, EUR per tCO_2, 2018

H. Environment-related inventions
2014-16 average
% of all technologies
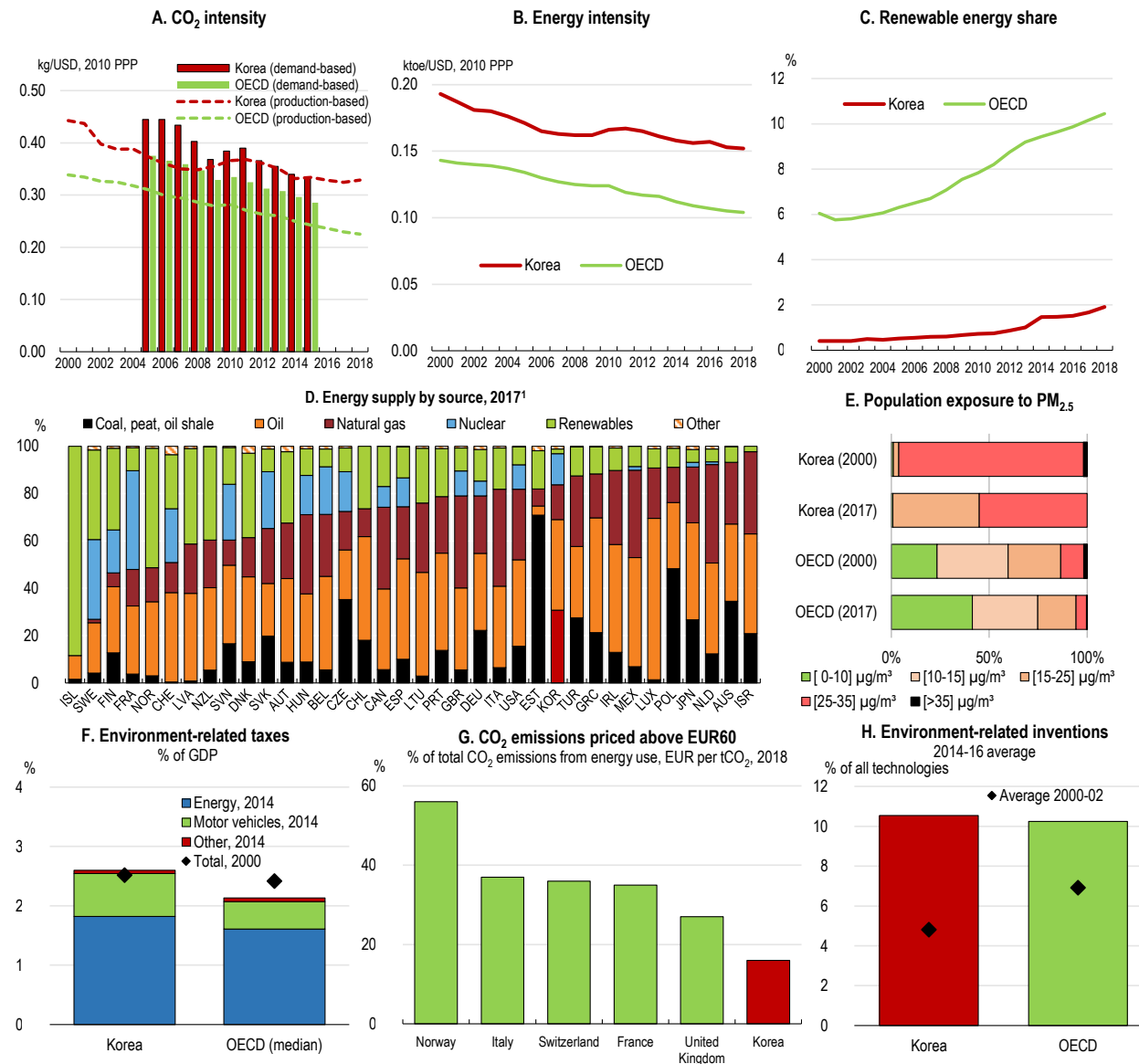
1. Data may include provisional figures and estimates.
Source: OECD Green Growth Indicators database, IEA (2018), World energy balances, IEA World Energy Statistics and Balances database.

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Korea could consider reviewing its regulatory policies, which may favour coal over renewables through high capacity and carbon compensation payments for coal-fired plants (Carbon Tracker Initiative, 2019). Low regulated electricity prices hamper the entry of renewables, as well as investment in technologies facilitating flexible demand response, which are key to integrating high intermittent renewable supply, especially in Korea, where there is no international interconnection of the electricity grid. Hence, electricity

prices should be gradually raised to reflect costs once the economy is recovering, providing targeted support decoupled from energy use to vulnerable households affected by price increases. Korea could also take inspiration from the United Kingdom, where carbon taxes and air pollution standards were major contributing factors in reducing the coal share in electricity from around 40% in 2012 to close to zero.

Revenue from environmental taxation amounts to a greater share of GDP than the OECD median (Panel F). However, petrol is taxed more than diesel. Korea introduced the world's second largest emission trading scheme (ETS) in 2015, which covers around 70% of national direct GHG emissions and plays a major role in climate change mitigation. Most emissions are priced below EUR 60 per tonne of CO2, a midrange estimate of climate costs in 2020 (OECD, 2018c) (Panel G). A commitment to gradually rising carbon pricing in line with emission reduction targets would minimise adjustment cost. The government has allocated 3% of ETS permits through auctioning in the second phase of the scheme (2018-20), a proportion which will increase to at least 10% in the third phase (2021-25). Free allocation harms incentives to reduce emissions, as permits need to be allocated according to criteria, such as production, which relate to emissions (Flues and van Dender, 2017), with adverse impacts on government finances and inclusiveness. Korea could consider following the European Union in fully auctioning permits to electricity generation, which is not subject to direct international competition.

The Seoul Metropolitan Area management system to cap air pollutant emissions put in place in 2008 has contributed to a trend reduction in air pollution, and there are plans to extend it to other areas of the country. Allocations for NOx and SOx have been gradually reduced and could be cut further. Compliance monitoring of industrial emissions needs to improve through better targeting of inspections, more independent inspectors and better evaluation of regulation (OECD, 2019g). Provincial and local governments' capacity to carry out related tasks also needs strengthening, including more funding.

The NCCA recommends further tax incentives to reduce business emissions and tighter regulations on coal power plants, diesel cars and machinery. Implementation already started in some areas, for example, old diesel cars are banned from central Seoul from December 2019. Ministries will submit action plans to implement the recommendations in 2020. Korea could emulate Chile and Sweden, which tax air pollutants from large industrial sources nation-wide.

Korea is a world leader in overall R&D and its share of environment-related inventions is slightly over the OECD average and rising (Panel H), with current priorities including hydrogen, renewable energy and intelligent power systems. The government has set an ambitious hydrogen agenda for road transport emissions. Digital-based shared mobility can achieve emissions reductions at low cost, as well as complement the roll-out of zero-carbon passenger transport, reducing investment needs and other transport-related externalities. Against the backdrop of increased use of single-use plastic as part of sanitary precautions in the face of the COVID-19 crisis, the government recently announced an agreement with the packaging and delivery sectors to cut their plastic use by 20%, by standardising containers, making them thinner and facilitating reuse and recycling.

Table 1.11. Past recommendations on environmental policy

Main recent OECD recommendations	Action taken since the 2018 Survey or planned
Steadily increase the share of permits auctioned and the stringency of the total emission cap in the emissions trading system.	The government has allocated 3% of the allowance through auctioning in 2018-20 and will expand this share to over 10% in 2021-25. To achieve the Nationally Determined Contribution by 2030, the total emission cap will be consistent with annual emission targets under the Korean emissions trading system.
Raise environmentally-related taxes, in part to close the gap between diesel and petrol taxes, and boost electricity prices.	In November 2019, the government announced the comprehensive fine dust management initiative, including a plan to review diesel and gasoline prices. The government intends to review related policies, on the basis of studies from experts. In order to reduce pollution, the tax on soft coal has increased and tax benefits for replacing old diesel vehicle have been introduced in December 2018.

Key policy insights recommendations

Key recommendations in bold

MAIN FINDINGS	RECOMMENDATIONS
Policies to mitigate the impact of the COVID-19 pandemic	
The government has taken a wide range of measures to support households and businesses during the crisis. Prolonging some current temporary measures and/or providing additional support may be necessary if the crisis lingers.	**Continue to provide support to households and businesses until the economy is recovering, targeting any additional income support towards low-income households.** **Ensure that fiscal plans preserve long-term fiscal sustainability.**
Sound public finances allow fiscal stimulus to strengthen the recovery.	**Support growth-enhancing investments, notably in digital fields, such as 5G infrastructure and artificial intelligence.** **Perform cost-benefit analysis of investments.**
Inflation is set to remain very low over the coming years, the economic recovery is likely to be slow and macro-prudential tools are in place to ensure financial stability.	**Maintain accommodative monetary policy and consider unconventional measures going beyond liquidity support.**
Financial and monetary authorities need to take into account climate-related risks in financial markets.	Require financial intermediaries to report their climate-related exposures to the financial supervisor.
Environmental policies	
Notwithstanding an ephemeral improvement as the COVID-19 crisis depressed activity, air pollution is a major challenge, with detrimental impacts on health and well-being.	**Tighten caps for air pollutant emissions and strengthen vehicle emission standards.**
Low regulated electricity prices do not reflect production, distribution and environmental costs and hamper the entry of renewables, as well as investment in technologies facilitating flexible demand response.	Once the economy is recovering, raise electricity prices gradually, providing targeted support decoupled from energy use to vulnerable households. Increase government support for the transition towards renewable energy.
Only 3% of ETS permits are auctioned, increasing to 10% in 2021-25.	Increase the share of permits auctioned and the stringency of the total emission cap of the emissions trading system.
Effective carbon prices are low and vary across sectors and fuels.	**Price CO2 emissions evenly across sectors and fuels and raise pricing according to a predictable schedule**.
Petrol is taxed more than diesel and road transport fuel taxation has fallen in real terms.	Raise the excise tax on diesel to at least match that on petrol and index rates to inflation.
Fighting corruption	
Coordination between Korea's police and prosecutors' offices and reporting requirements of suspected bribery are insufficient.	Clarify coordination mechanisms between Korea's police and prosecutors' offices and reporting requirements of suspected bribery to relevant law enforcement agencies.
Bribery sanctions for natural and legal persons are not dissuasive enough.	Increase sanctions for bribery of natural and legal persons in law and in practice.

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Annex 1.A. Progress in other structural reform areas

(Main recommendations from the 2018 OECD Economic Survey not in body of the KPI)

Main recent OECD recommendations	Action taken since the 2018 Survey or planned
Reinforce the role of outside directors by enhancing the criteria for independence, reducing the role of management in nominating outside directors and requiring that outside directors comprise more than half of the boards in all listed firms.	The Ministry of Justice amended in January 2020 the Enforcement Rule of the Commercial Act, which requires disclosure of information that allows judging a director or auditor candidate's level of independence and expertise, and includes tighter disqualification rules for outside directors or auditors.
Phase out existing circular shareholding by firms belonging to the same business group.	The number of circular shareholdings decreased by 85% to 13 in 3 business groups in 2019 from 282 in 10 business groups in 2017.
Make cumulative voting (which would allow minority shareholders to elect directors) and electronic voting (which would help minority shareholders to vote their shares) mandatory.	The relevant draft amendment of the Commercial Act including electronic voting and multi representative lawsuit, is under discussion at the National Assembly. Meanwhile, to facilitate electronic voting, the draft amendment of the Enforcement Rule of the Commercial Act, which includes the diversification of authentication means, among others, has taken effect since January 2020.

Annex 1.B. Government measures to address the COVID-19 crisis

The government has implemented many measures to mitigate the pandemic's impact on employment, output and business investment. Korea has imposed quarantine and strong distancing measures to contain the initial outbreak of the virus and prevent massive infection. The government has so far introduced measures for a total of KRW 277 trillion (14.4% of GDP). Three supplementary budgets totalling KRW 59.0 trillion were passed by the National Assembly. Loans and guarantees of over KRW 200 trillion have been supplied to households, SMEs and affected industries.

Border measures and quarantine measures

Early February the government banned the entry of travellers coming from Wuhan city and the Hubei province in China. Since then, the Korean authorities have strengthened special quarantine measures for people entering Korea in accordance with the evolution of the pandemic. As of May, all persons arriving in Korea, regardless of nationality, undergo a mandatory COVID-19 test, paid by the government (USD 120 per person) and are subject to a 14 day self-quarantine at home or government designated facilities.

While the government introduced enhanced physical distancing, so as to prevent diffusion of the virus, Korea did not introduce a lockdown on any city or region. The authorities recommended to suspend the operation of religious meetings, indoor sports and entertainment facilities temporarily to avoid community infections, and also urged citizens to stay at home and work remotely. The new semester for schools, which was supposed to start on 2 March, was postponed. On 6 May, the government started to lift those enhanced distancing requirements and shift towards softer distancing measures, so-called "distancing in daily life". However, the strong distancing guidelines were reinstated in some local areas in late May following the emergence of new infection clusters. The schools, which started online class on 9 April, have opened in phases from 20 May to 8 June. Meanwhile, universities, which opened online class on the second week of March, are likely to extend their non-face-to-face class periods to the end of spring semester.

Fiscal policy and financial support

Over the 5-28 February period, when the virus outbreak started to hit the economy, the government announced emergency support plans of about KRW 20 trillion for households, small companies and damaged industries, including automobile parts, low-cost carriers, shipping, tourism, and export sectors:

- Support for pre-emptive quarantine and treatment (KRW 0.1 trillion)
- Guarantees and loans with low interest rates for SMEs and low-cost carriers (KRW 4.8 trillion)
- Consumption coupons and support for family care leave (KRW 2.8 trillion)
- Support for local credit guarantee funds (KRW 0.5 trillion)
- Liquidity provision to the financial sector (KRW 8.2 trillion)
- Double the deduction of credit card use and reduction of individual consumption tax on cars to boost consumption (KRW 1.7 trillion)

On 17 March, the national Assembly approved a supplementary budget of KRW 11.7 trillion (USD 10 billion, 0.6% of GDP), consisting of KRW 10.9 trillion for new expenditure and KRW 0.8 trillion for revenue adjustment. New spending includes:

- Support to the healthcare sector for virus prevention, diagnosis and treatment (KRW 2.1 trillion)
- Loans for small and medium businesses and small merchants (KRW 4.1 trillion)
- Emergency livelihood support and day-care vouchers (KRW 3.5 trillion)
- Support to severely affected industries and employees in the form of expanded employment retention subsidy and financial support (KRW 1.2 trillion)

On 19 and 24 March, the government announced an additional financial support package of KRW 100 trillion (5.1% of GDP) to ease the financial burden on small businesses and vulnerable households:

- Expansion of financial support for SMEs, small merchants and self-employed (KRW 29.2 trillion)
- Support loans and guarantees for mid-sized enterprises – a class of enterprises in between SMEs and large enterprises (KRW 29.1 trillion)
- Stabilisation of the corporate bond and money markets through various policy tools worth KRW 31.1 trillion, including the establishment of a Bond Market Stabilisation Fund (KRW 20 trillion)
- Securities Market Stabilisation Fund liquidity provision funded by financial institutions (KRW 10.7 trillion)

On 8 April, the government announced a 10.4 trillion financial support package for export companies, start-ups and ventures, including:

- Loans and guarantees for export companies (KRW 6.0 trillion) and for start-ups and ventures (KRW 2.2 trillion)
- Expanded government support for lowering R&D costs (KRW 2.2 trillion)

On 22 April, the government announced a KRW 75 trillion (4.0% of GDP) support plan for strategic industries and additional financing for SMEs and households:

- Establishment of a Key Industry Relief Fund guaranteed by the government to provide liquidity and purchase corporate debt and equity for the country's backbone industries – airlines, shipping, (KRW 40 trillion). Large corporate recipients must retain at least 90% of their employees for six months and some conditions are imposed on management, such as a ban on dividend payments and stock buybacks
- Additional financing for SMEs and households with low credit ratings (KRW 35 trillion)
- Strengthening employment security measures to support those workers who are not enrolled in the Employment Insurance scheme and to create jobs in the public sector (KRW 10.1 trillion)

On 30 April, the National Assembly passed the second supplementary budget of KRW 12.2 trillion (USD 10 billion) for emergency relief grants. A total of KRW 14.3 trillion (0.6% of GDP) including KRW 2.1 trillion of local government funds is allocated to the relief programme. The central government will finance KRW 3.4 trillion with debt issuance and the remaining KRW 8.8 trillion from spending restructuring. The government has distributed the relief grants of up to KRW 1 million (USD 814) in the form of cash or coupons to all 21 million households in accordance with the size of the family:

- About 2.7 million households in the lowest income bracket (13% of the total) will receive the grants in cash
- The remaining 19 million households can apply for the grants in the form of coupon or credit card points
- The coupons or points will have to be spent by 31 August or will be considered a donation to the state

- The government gives a tax benefit to those who donate their relief handouts

On 3 July, the National Assembly passed the third supplementary budget, of KRW 35.1 trillion (1.8 % of GDP). The budget will be funded through the issuance of KRW 23.7 trillion won in national bonds and KRW 11.4 trillion in spending readjustments. It aims at:

- Creating about 550 000 jobs in publicly initiated programmes and strengthening social safety nets (KRW 10 trillion)
- Providing emergency loans to struggling small merchants, SMEs and large businesses (KRW 5 trillion)
- KRW 4.8 trillion investment in 2020 on big data platforms, artificial intelligence and fifth-generation telecommunication services, so called *New Deal* projects

Monetary policy and macro prudential measures

On 27 February, the Bank of Korea (BOK) increased the ceiling of the Bank Intermediated Lending Support Facility by KRW 5 trillion to KRW 30 trillion (further increased to KRW 35 trillion on 14 May) to support SMEs and small merchants.

On 13 March, the Financial Services Commission introduced a six-month (from 16 March to 15 September) ban on short-selling in the stock market to contain volatility.

On 16 March, the Bank of Korea cut the policy rate by 50 basis points to 0.75%. It also lowered the interest rate on the Bank Intermediated Lending Support Facility from 0.50%-0.75% to 0.25% to encourage bank lending to SMEs. The BOK broadened the eligible collateral and institutions for open market operations and the acceptable collateral for lending facilities to inject more liquidity in the financial markets.

On 19 March, the Bank of Korea conducted repo operations to inject KRW 1 trillion (followed by an additional KRW 2.5 trillion on 24 March) to ensure that financial institutions retain access to short-term credit.

On 19 March, the BOK announced the establishment of a USD 60 billion bilateral currency swap agreement with the US Federal Reserve, for 6 months. The Ministry of Economy and Finance, the Financial Services Commission, the Bank of Korea and the Financial Supervisory Service eased the macroprudential measures to expand foreign currency liquidity:

- Raising ceilings on the foreign exchange derivatives positions of local banks (from 40% to 50% of their equity capital) and foreign bank branches in Korea (from 200% to 250% of their equity capital)
- Temporarily lifting the levy on non-deposit foreign exchange liabilities of financial institutions
- Temporarily lowering the foreign exchange liquidity coverage ratio by 10 percentage points to 70%

On 20 March, to ease the stress on the bond market, the Bank of Korea purchased KRW 1.5 trillion (with further purchases of KRW 1.5 trillion on both 10 April and 2 July) of treasury bonds.

On 26 March, the Bank of Korea introduced an unlimited repo purchase facility for three months starting in April (further extended for one more month on 25 June) to ensure financial market stability.

On 16 April the BOK decided to provide loans of KRW 10 trillion to bank and non-bank financial institutions, such as securities companies and insurance companies, for three months.

In order to expand financial institutions' collateral capacity, the Bank of Korea lowered the ratio of collateral for guaranteeing net settlements on 10 April and broadened the eligible collateral for the same on 25 May.

On 28 May, the Bank of Korea cut the policy rate by 25 basis points to 0.50%.

Annex 1.C. Economic co-operation with North Korea

This annex provides an overview of recent developments with respect to economic co-operation between the two Koreas, and information on economic developments in North Korea, against the backdrop of an evolving and highly uncertain geopolitical context. More information is provided in Koen and Beom (2020).

Geopolitical developments

In the face of continued nuclear tests, United Nations and other international sanctions on North Korea were gradually stepped up in the course of the past decade, especially from 2016. Tighter sanctions have contributed to a sharp decline in recorded international trade and in estimated domestic activity (see below).

At the same time, however, a number of steps towards de-escalating tensions and a rapprochement between the two Koreas were taken:

- In July 2017, South Korea launched the Berlin initiative aiming at peaceful coexistence and common prosperity through dialogue and cooperation but without renouncing sanctions and pressure, with the following goals: establishing permanent peace through the denuclearisation of North Korea; developing sustainable inter-Korean relations; and pursuing a new economic initiative with an East Coast Belt, a West Coast Belt and a DMZ Belt.
- In February 2018, North Korea took part in the Winter Olympics held in Pyeongchang, South Korea.
- In April 2018, the leaders of South and North Korea held a summit in Panmunjom, the third such meeting since 2000. They signed a declaration that called for the complete denuclearisation of the Korean Peninsula, for a peace treaty to replace the armistice in place since the end of the Korean War, for steps to ease military tensions, for expanded economic co-operation between the two Koreas and for increased humanitarian exchanges.
- In May 2018, the leaders of South and North Korea met again in Panmunjom.
- In June 2018, the US President met with the North Korean leader in Singapore, the first-ever such meeting. They signed a joint statement, agreeing to security guarantees for North Korea, new peaceful relations, the denuclearisation of the Korean Peninsula, the recovery of soldiers' remains, and follow-up negotiations between high-level officials.
- In September 2018, the South Korean President visited Pyongyang and Mount Baekdu. The leaders of South and North Korea signed a Military Agreement and a declaration calling for civilian exchanges and cooperation in many areas, and conditions to denuclearise North Korea.
- In February 2019, the US President met with the North Korean leader in Hanoi but the summit was cut short without an agreement.
- In June 2019, the US President met with the leaders of South and North Korea in the Demilitarised Zone, and became the first sitting US President to set foot on North Korean soil.

In the course of 2019, however, these negotiations gradually lost momentum even as North Korea stepped up missile testing and gave signs of reorienting diplomatic efforts towards China and Russia, which supported a loosening of the international sanctions regime. With no progress in lifting sanctions and in advancing inter-Korean projects, North Korea blamed South Korea and the United States while escalating tensions. In June 2020, it blew up the inter-Korean joint liaison office built by South Korea in the Gaeseong Industrial Complex, ostensibly by way of retaliation against propaganda leaflets which North Korean defectors had sent toward the North using balloons.

Economic developments and the COVID-19 crisis

Estimates of external trade and domestic economic activity in North Korea are very crude and unreliable. The country has published virtually no national account statistics nor any budget information in level terms in recent decades. Trade data are based on imperfect mirror statistics published by North Korea's trading partners (which sometimes confuse North and South Korea), and thus fail to capture a substantial share of actual trade flows, notably small and large-scale smuggling across land borders and illegal ship-to-ship oil transfers on the open seas, which routinely circumvent international sanctions (UN Panel of Experts, 2020). Estimates of domestic economic activity in North Korea are produced by the Bank of Korea in Seoul, based on an eclectic array of information sources.

Keeping those very strong caveats in mind, North Korea's recorded trade has shrunk dramatically since 2015. Trade between the two Koreas essentially stopped, with only USD 6.7 million worth of goods shipped from the South to the North in 2019, and USD 0.2 million in the opposite direction. The volume of trade with China dropped sharply but the share of trade with China has risen and exceeded 95% in 2019 (Figure 1.C.1). The trade squeeze contributed to a large contraction in estimated real GDP in 2017 and 2018 (Figure 1.C.2). Real GDP inched up in 2019 but will likely shrink in 2020 in the context of the COVID-19 crisis (see below).

Accounting for over a fifth of GDP, agriculture remains a large and poorly performing sector, notwithstanding the objective to promote the adoption of high-yielding seed varieties and advanced crop cultivation and management techniques enshrined in the 2016-20 Strategy for National Economic Development. The sector has suffered considerably in recent years from the combination of droughts and floods, whose impact is amplified by poor irrigation and drainage systems, and economic sanctions, which have restricted the imports of fuel, machinery and spare parts (FAO/WFP, 2019).

Annex Figure 1.C.1. North Korea's recorded foreign trade

Exports plus imports of goods
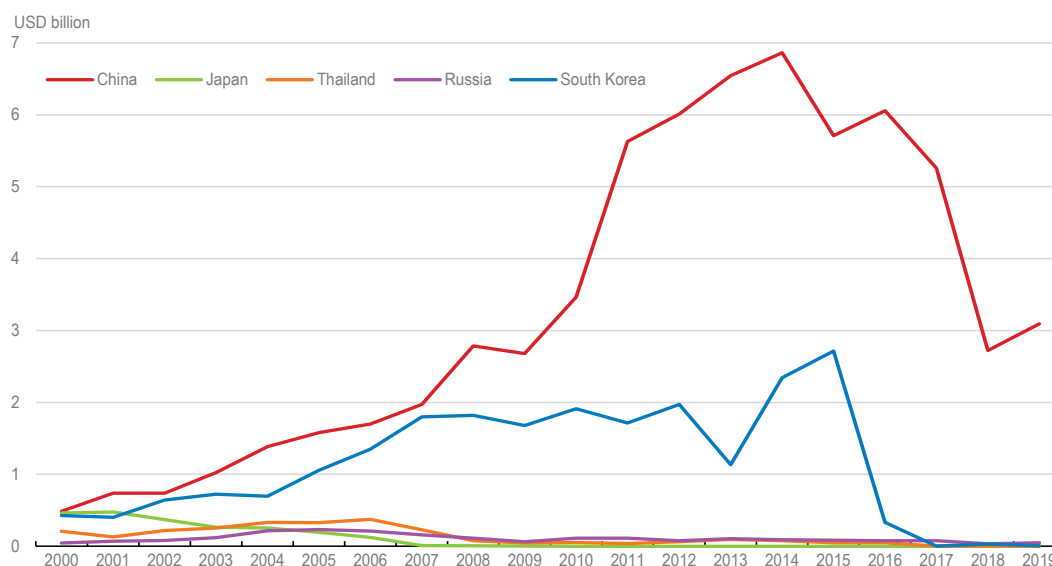
Note: Based on trading partners' mirror statistics.
Source: Korea International Trade Association.

StatLink ⧉ https://doi.org/10.1787/888934157036

Annex Figure 1.C.2. Estimated GDP level and growth rate
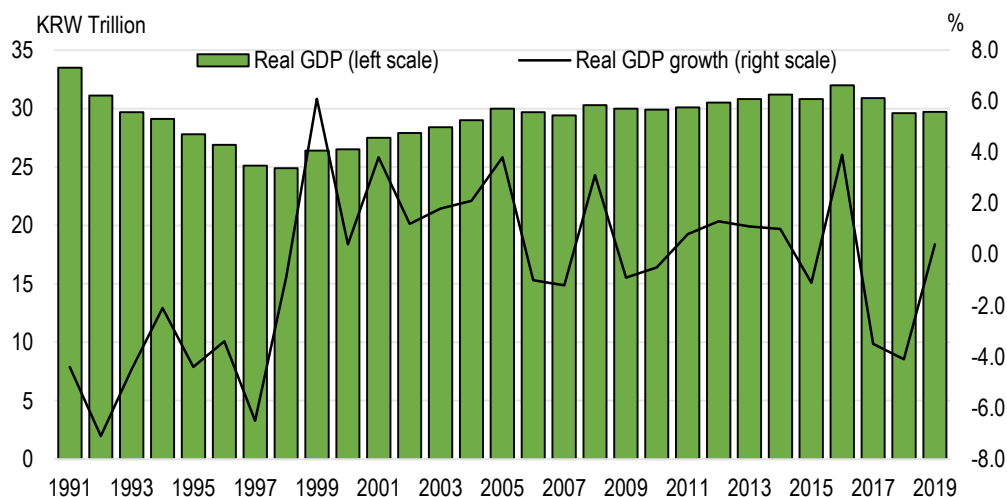
Note: Estimated at 2010 constant prices (using South Korea relative prices).
Source: Bank of Korea

Among the main sectors of the economy, services stand out as still expanding, albeit at a modest pace. This likely reflects inter alia the regime's efforts to spur tourism, in particular from China (Yoon, 2019), but also vibrant formal wholesale and retail markets, whose number stood around 500 by early 2019 – not counting the many informal markets (Lee, 2019).

Tourism is one important source of foreign currency in North Korea. Another are the North Korean workers dispatched abroad. Under the international sanctions, they were required to return to their home country by late December 2019, but a number of them most probably continue to work abroad, either with a different visa status or undeclared (Fromer, 2019). A third source are the fast expanding sales of smartphones and associated call plans, which are payable only in hard currency: around 6 million people, or close to one quarter of North Korea's total population, were recently deemed to carry a smartphone (Park, 2019).

The outbreak of the COVID-19 pandemic has substantially affected many of the aforementioned sectors of the economy, even though North Korea claims not to have recorded any case domestically (see the NK Pro tracker for details). One of the consequences is that it may exacerbate food shortages, notwithstanding political calls for achieving self-reliance in this area. In this context, the United Nations Office for the Coordination of Humanitarian Affairs has developed a preparedness and response plan, in conjunction with the Government, aiming to ensure that humanitarian impacts of the COVID-19 crisis on vulnerable people and communities are mitigated through continual prioritisation of food security, nutrition, health, water, sanitation and hygiene interventions (OCHA, 2020).

The North Korean authorities acted swiftly in the face of the COVID-19 threat. Air China flights between Beijing and Pyongyang were suspended on 20 January and so were national carrier Air Koryo flights soon thereafter and Chinese tourism more generally. On 21 January, North Korea was reportedly already working with the World Health Organisation to try and prevent the spread of the virus in the country, whose health system is ill-equipped to cope with such a pandemic, as the country's ranking on the Global Health Security Index illustrates (Johns Hopkins Center for Health Security, 2019). Quarantine measures followed, including school and university closures, as well as mass disinfection campaigns.

The COVID-19 crisis has highlighted the country's high dependence on China, cutting off some of North Korea's major sources of supply and the main market for its products – a situation that is hard to sustain for an economy with limited buffers and stretched resources. Indeed, while North Korea closed its border with China in January 2020, some traffic has reportedly resumed, with exemptions provided by the Chinese authorities to North Korean traders in late March (Jang, 2020), container trucks seen to again cross the Sino-North Korean Friendship Bridge by early April (Ha, 2020) and a freight train loaded up in Dandong with foodstuffs and construction supplies spotted in Pyongyang in May (Mun, 2020). The supply chain disruptions and work stoppages entailed by the COVID-19 crisis have put pressure on State finances. Reportedly, this has led to the first issuance of public bonds since 2003 (Kim, 2020), with the new entrepreneurial class (*donju*) being forced to buy them with foreign currency, and another portion of the bonds to be used by State institutions and companies to pay their suppliers.

Economic cooperation between the two Koreas has not progressed much since the suspension of all activity in the Gaeseong Industrial Complex in February 2016. One area envisaged in 2018 was to help improve the North's vast but antiquated rail network. With the approval of the United Nations, the two Koreas jointly conducted a field study on two main railways in 2018 (the Gaeseong to Sinuiju line and the Geumgang to Tuman River line), but progress on the ground is impeded by the prohibition, under the international sanctions, to bring in machinery and construction materials. The South Korean government has also offered humanitarian support. Last year, it proposed 50 000 tonnes of rice via the World Food Programme to address food shortages, which by mid-2020 had not been accepted, however. It has furthermore decided to contribute USD 4.9 million to a multi-year project run by the United Nations Economic and Social Commission for Asia and the Pacific to help improve statistical literacy in North Korea. In the context of the COVID-19 crisis, South Korea has offered to cooperate in the area of health, and in particular to launch a joint response system against infectious diseases, to help cope with growing threats from global pandemics.

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2 Raising employment and enhancing job quality in the face of rapid ageing

Korea has the fastest ageing population in the OECD, with the number of persons aged 65 or over projected to exceed 80% of the working-age population in 2060, the highest ratio in the OECD. In the absence of a strong policy response, this will lower economic growth, widen inequality and weaken well-being, and challenge public finance sustainability and welfare provision. The COVID-19 crisis will exacerbate these tensions, as it will persistently lower growth and employment and affect low-income workers most. Against this background, Korea needs to shelter its workforce from the crisis as much as possible, to prevent scarring and unemployment hysteresis, and better mobilise its labour resources once the recovery is underway. This chapter draws on the OECD's new Jobs Strategy to suggest ways to raise employment and foster inclusive growth. Lifting the employment rate and quality of jobs of Korean women, who are on average highly skilled, should be a priority. Koreans effectively retire at an advanced age, but often end their working lives in poor-quality non-regular jobs, after being forced to retire from their career job in their fifties for various reasons. Maintaining high activity rates, while enhancing the quality of jobs for older workers will be crucial to sustain the economy's growth potential and, along with welfare reforms, alleviate old-age poverty. To achieve these goals and to lift labour productivity, which remains low by OECD standards, Korea will need to reduce labour market duality and improve job matching. This requires a shift in policies. The COVID-19 crisis has triggered actions to protect the most vulnerable workers. The reinforcement of the social safety net could facilitate a more permanent shift from protecting jobs to protecting workers, which along with enhanced active labour market policies, would support employment and productivity growth.

The COVID-19 crisis is lowering employment, especially for non-regular workers (Figure 2.1), and is set to have a lasting effect on the economy, as well as on public finances, despite ambitious government measures to support employment (Box 2.1). This will compound Korea's ageing challenge, which is more acute than in any other OECD country, with the old age dependency ratio set to increase from about 20% currently to more than 80% in 2060 (Figure 2.2), clouding economic growth prospects and generating risks of widening inequality and weakening well-being, as well as challenges for public finances and the welfare system. Nevertheless, well-designed policies can address the ageing challenge and the "silver economy" also offers opportunities. No negative association between population ageing and GDP per capita growth appears across large samples of OECD and non-OECD countries, as ageing countries tend to adopt labour-saving technologies (Acemoglu and Restrepo, 2017). Korea's strength in technology and the innovation capability demonstrated during the COVID-19 crisis could help Korea face the demographic headwinds. At the microeconomic level, ageing provides opportunities for businesses producing goods and services demanded by older people. As ageing is a global phenomenon, building a comparative advantage in the silver economy could enhance export performance. Last but not least, higher and better employment for older workers would raise their purchasing power and allow them to consume more, generating a virtuous cycle.

Figure 2.1. Employment falls sharply in services and among non-regular workers

Year-on-year percentage change (unless otherwise specified), June 2020

* Percentage points.
Note: The self-employed are divided between employers and own-account workers.
Source: Statistics Korea.

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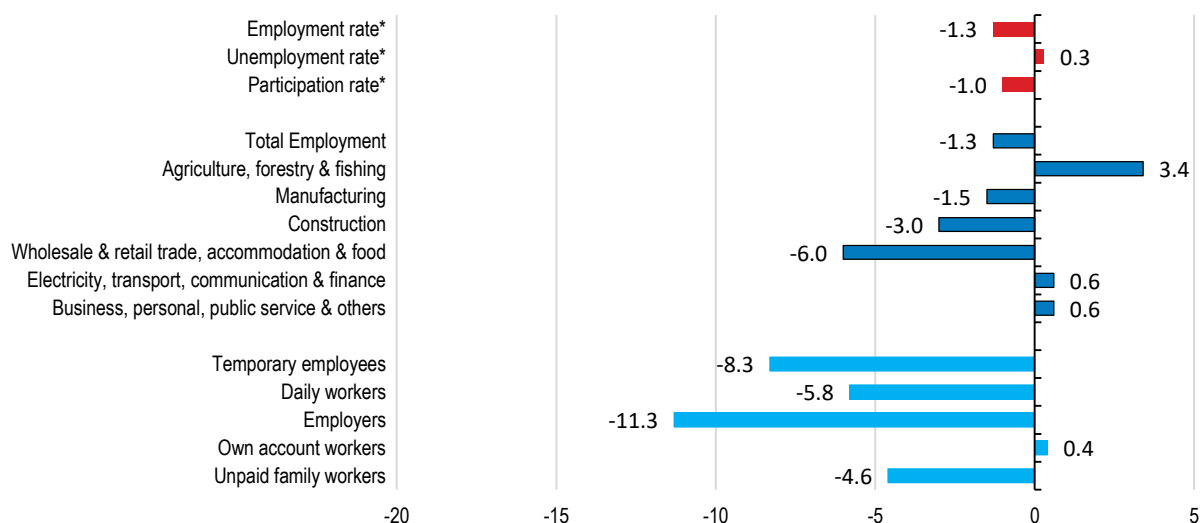
Box 2.1. Main government measures to support employment and incomes during the COVID-19 crisis

Many measures implemented by the government to support the economy during the COVID-19 crisis (see Chapter 1) support employment, directly or indirectly. This box focusses on direct measures to preserve or create jobs and on income support.

Subsidy for introducing flexible work arrangements. From February 25, application procedures are temporarily simplified. SMEs who introduce commuting with time difference, work from home, remote work or selective work hours can receive up to KRW 5.2 million a year per employee.

Measures to support employment security (presented on 28 February 2020). Easing of eligibility conditions for the Employment retention subsidy and increase of its level from half to two thirds of the wage paid for large companies and from two thirds to three quarters for SMEs, for six months (February to July). On 25 March, the subsidy was increased further for three months (April to June), to up to 90% of the wage paid for SMEs in all industries. The estimated cost is KRW 0.8 trillion. Additional employment support is available for the regions and economic sectors (e.g. tourism and accommodation) most affected by the virus outbreak.

Support for job retention (presented on 22 April 2020). The government announced its Employment and Business Stability Measures to keep workers employed and to stabilise their livelihood. The government put together support measures totalling up to KRW 10.1 trillion, which can support 2.86 million persons. In addition, a KRW 40 trillion stabilisation fund for mainstay industries was unveiled, which provides funding to employers under the condition that they keep their employees.

Income support. From May 2020, relief checks of up to KRW 1 million (USD 820) are being sent to all households, for a total amount of KRW 14.3 trillion (about 0.7% of GDP). Cash payments are first directed to some 2.8 million households in the lowest income bracket (13% of the total) and others will receive coupons to spend within three months. The coupons will have to be spent by 31 August or will be considered a donation to the state. People can decide whether to apply for relief handouts for their own use it or to donate them to help the nation overcome the employment crisis caused by COVID-19. The relief handouts that the people voluntarily donate will be used to fund government projects that help maintain and create jobs for the vulnerable population. On 7 May, the government announced emergency unemployment support of a total of KRW 1.5 trillion for temporary workers, including platform and freelance workers. The first 2020 supplementary budget, passed on 17 March, included emergency support for distressed households. Some regional authorities have provided additional support (OECD, 2020a).

Public sector and subsidised job creation (presented on 22 April and 14 May 2020). 1.54 million public sector jobs will be created. Administrative procedures will be eased to speed up the creation of the 945 000 jobs already planned for 2020. Among them, more than 600 000 jobs will be positions for the elderly and the socially disadvantaged. More than 550 000 additional jobs for young adults and low-income earners will be created, including remote, tech and SME jobs, as well as 48 000 permanent jobs in the public sector. The programme will require KRW 3.6 trillion, which will mainly be financed through the third 2020 supplementary budget (35.1 trillion, 1.8% of GDP).

Source: Ministry of Economy and Finance, Ministry of Employment and Labour and OECD (2020b).

Figure 2.2. The old-age dependency ratio is set to be the highest in the OECD in 2060
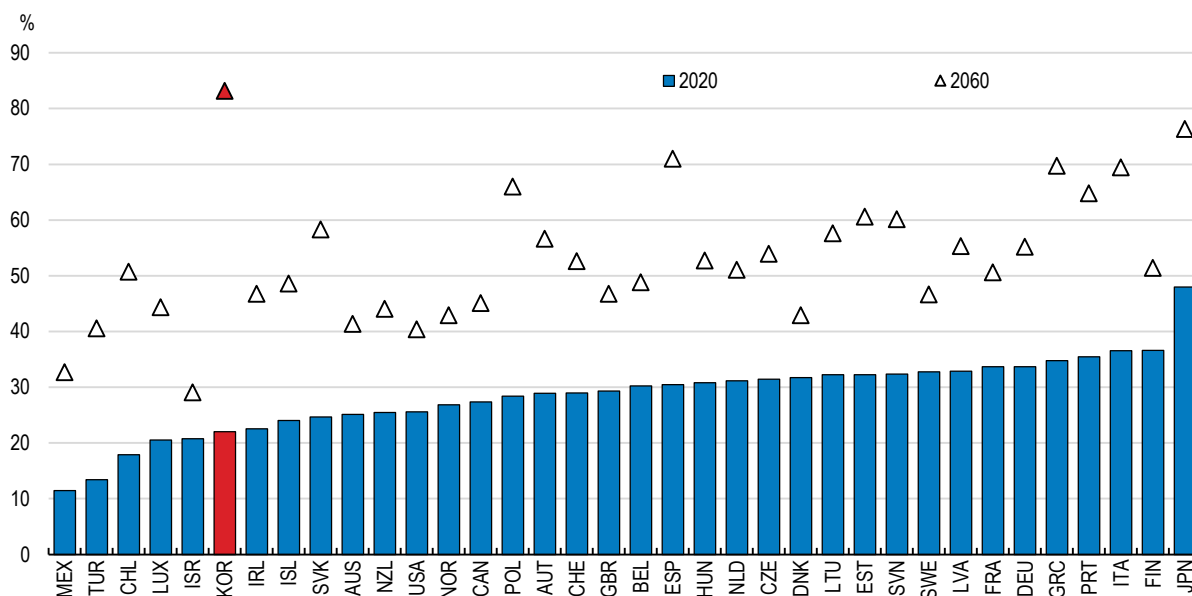
Note: Ratio of population aged 65 and over to population aged 15-64. Projections are based on the medium fertility variant.
Source: *United Nations, Department of Economic and Social Affairs, Population Division (2019), World Population Prospects 2019.*

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Fostering solid inclusive growth in the face of the demographic headwinds calls for both better mobilising Korea's high-quality labour resources and increasing labour productivity. Long-term scenarios suggest that this could boost average annual GDP per capita growth in 2020-60 by 1 to 2 percentage points. This chapter focusses on mobilising labour resources, drawing on the OECD's new Jobs Strategy (Box 2.2). Productivity is addressed in Chapter 3.

Box 2.2. The OECD's new Jobs Strategy

The digital revolution, globalisation and demographic change are transforming labour markets. These deep and rapid transformations raise new challenges for policy makers. The new OECD Jobs Strategy, endorsed by OECD Ministers at their annual meeting in May and launched in December 2018, provides a coherent framework of detailed recommendations in a wide range of policy areas to help countries address these challenges. The new Jobs Strategy goes beyond job quantity and considers job quality and inclusiveness as central policy priorities, while stressing the importance of resilience and adaptability for good economic and labour market performance in a changing world of work. The key message is that flexibility-enhancing policies in product and labour markets are necessary but not sufficient. Policies and institutions that protect workers, foster inclusiveness and allow workers and firms to make the most of ongoing changes are needed to promote good and sustainable outcomes. The OECD Jobs Strategy makes use of a data dashboard to assess the strengths and weaknesses of labour markets.

The OECD actively supports countries with the implementation of the OECD Jobs Strategy through the identification of country-specific policy priorities and recommendations. This is done through special chapters in the *OECD Economic Surveys*, as well as analytical background papers. The analysis in this chapter is supported by analytical background papers that focus on two key policy priorities for Korea, namely promoting labour market inclusiveness by providing better employment opportunities for disadvantaged groups (Fernandez et al., 2020), and promoting job quality by reducing the incidence of very long working hours (Hijzen and Thewissen, 2020). The process will be concluded with a synthesis report that will draw lessons from the country reviews and highlight good

practices across the full range of policy tools identified by the OECD Jobs Strategy. More information on the implementation of the OECD Jobs Strategy can be found here: http://www.oecd.org/employment/jobs-strategy.

Source: OECD (2018a), Good Jobs for All in a Changing World of Work: The OECD Jobs Strategy.

Korea's employment rate is below the OECD average, largely due to low female employment. The gender employment gap for people aged 15-64 is nearly 18 percentage points, the fourth largest in the OECD, as relatively low wages and career prospects often discourage women from working. More than 40% of female wage earners are in non-regular employment, which prevents them from making the most of their generally high level of qualification. A number of policies can promote better employment and career progression opportunities for women, including enhancing childcare quality, supporting better work-life balance, facilitating return to work after career breaks, tackling discrimination and more generally promoting a culture of gender equality. These policies could also have a positive impact on the fertility rate, which has fallen to around one, the lowest level in the OECD. Traditional pro-natalist policies largely based on financial support for families in Korea and other East Asian countries have so far had limited impact, due to cultural obstacles, such as long working hours, family organisation and the role of mothers in children's education (Jones, 2019). Hence, since 2018 the Korean government has prioritised quality of life, gender equality and work-life balance (OECD, 2019a).

Even though older Koreans have a relatively high employment rate, especially because of the absence or low level of pensions, they tend to hold poor-quality non-regular jobs, after being forced to retire from regular jobs in their fifties for various reasons, such as poor business performance and business suspension or closure (33%), health conditions (20%), family care (14%) and mandatory retirement (7%). This generates old-age poverty, lowers well-being and productivity, and encourages working long hours (Hijzen and Thewissen, 2020). Promoting more flexibility in wages and lifelong learning can boost the level and quality of employment of older workers.

Reducing labour market rigidities and strengthening social protection is necessary to reduce labour market duality and improve job matching. A focus on protecting workers, through the expansion of the social safety net and active labour market policies, rather than protecting jobs, would contribute to raising well-being, employment and labour productivity, which is only about half of that in the top half of OECD countries. Greater use of foreign workers could alleviate labour shortages and related pressure to work long hours in small and medium enterprises (SMEs).

This chapter is structured as follows. The first part explores opportunities to raise employment, especially in groups where it remains relatively low, and outlines potential impacts on GDP growth and fiscal sustainability. The second part argues that greater labour market flexibility, combined with stronger social protection, would foster more inclusive growth.

Scarcer labour resources need to be better mobilised

Key challenges for the Korean labour market

Korea faces important challenges regarding labour market inclusiveness and certain aspects of job quality, as can be seen from the OECD Jobs Strategy dashboard (Figure 2.3). The gender labour income gap is the highest in the OECD, while the incidence of low incomes among working-age persons and the employment gap among disadvantaged groups are well above the OECD average. Promoting employment among under-represented groups should be a key priority. Concerns about job quality mainly relate to a high incidence of low pay and very long working hours (60 hours or more per week). These concerns tend to be amplified by a strongly segmented labour market.

- *Significant employment disparities exist between socio-economic groups*, underscoring the importance of tailored measures to improve outcomes. The employment gap with prime-age males

for disadvantaged groups is 31.8% (Figure 2.3). Employment gaps are particularly large relative to the OECD average for youth, women with young children, as well as for people with disabilities (Figure 2.4). The COVID-19 crisis highlights the vulnerability of disadvantaged groups to economic shocks. For example, while total employment declined by 1.3% year-on-year in June 2020, the fall was 8.3% for temporary workers and 5.8% for daily workers.

Figure 2.3. Korea faces important challenges with inclusiveness and some aspects of job quality
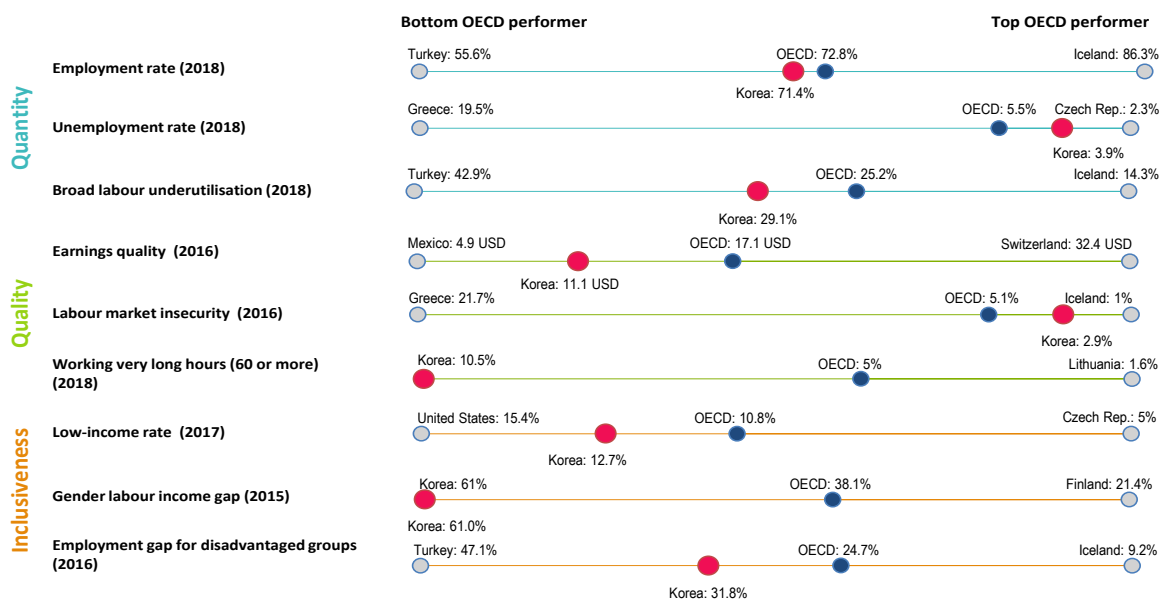
Note: Employment rate: share of working age population (20-64) in employment (%). Broad labour underutilisation: share of inactive, unemployed or involuntary part-timers (15-64) in population (%), excluding youth (15-29) in education and not in employment. Earnings quality: gross hourly earnings in PPP-adjusted USD adjusted for inequality. Labour market insecurity: expected monetary loss associated with the risk of becoming unemployed as a share of previous earnings. Working very long hours: percentage of workers working 60 or more actual weekly hours. Low income rate: share of working-age persons living with less than 50% of median equivalised household disposable income. Gender labour income gap: difference between per capita annual earnings of men and women (% of per capita earnings of men). Employment gap for disadvantaged groups: average difference in the prime age men's employment rate and the rates for five disadvantaged groups (mothers with children, youth who are not in full-time education or training, workers aged 55-64, non-natives, and persons with disabilities; % of the prime-age men's rate).
Source: OECD calculations based on statistics for 2018 or the last available year and various sources; OECD (2018a), *Good Jobs for All in a Changing World of Work: The OECD Jobs Strategy*, OECD Publishing, Paris.

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- *Low employment rates reflect worker-related barriers to employment*. New OECD empirical evidence based on micro data for Korea identifies employment barriers faced by individuals experiencing major employment difficulties (Box 2.3). The most frequent employment disincentive is a high partner or non-labour income (Figure 2.5), which discourages employment, particularly among households' second-earners (Fernandez et al., 2016). Furthermore, about 20-30% face work-readiness barriers related to low work-related skills, no past work experience or low education.

Figure 2.4. Disadvantaged groups face large employment gaps

Employment gap
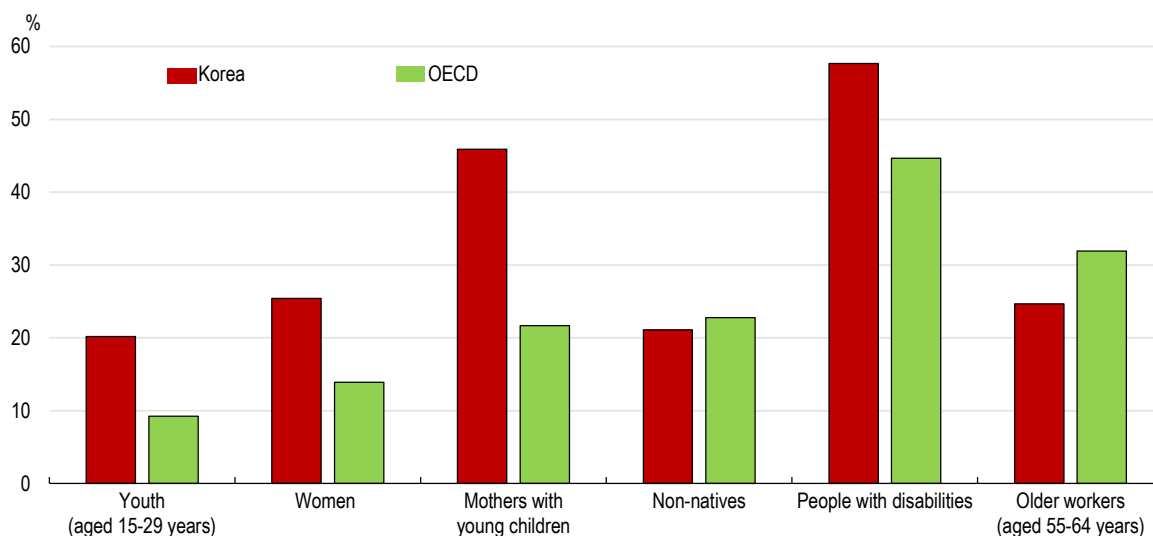
Note: Average difference in the prime age men's (25-54 years) employment rate and the rates for the five disadvantaged groups as a % of the prime-age men's rate. Youth excludes those in full-time education or training. Mothers with young children concern working-age mothers with at least one child aged 0-14 years. Non-natives refers to all foreign-born people with no regards to nationality. Data refer to 2016.
Source: OECD (2018a), Good Jobs for All in a Changing World of Work: The OECD Jobs Strategy.

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Figure 2.5. There are multiple worker-related barriers to employment
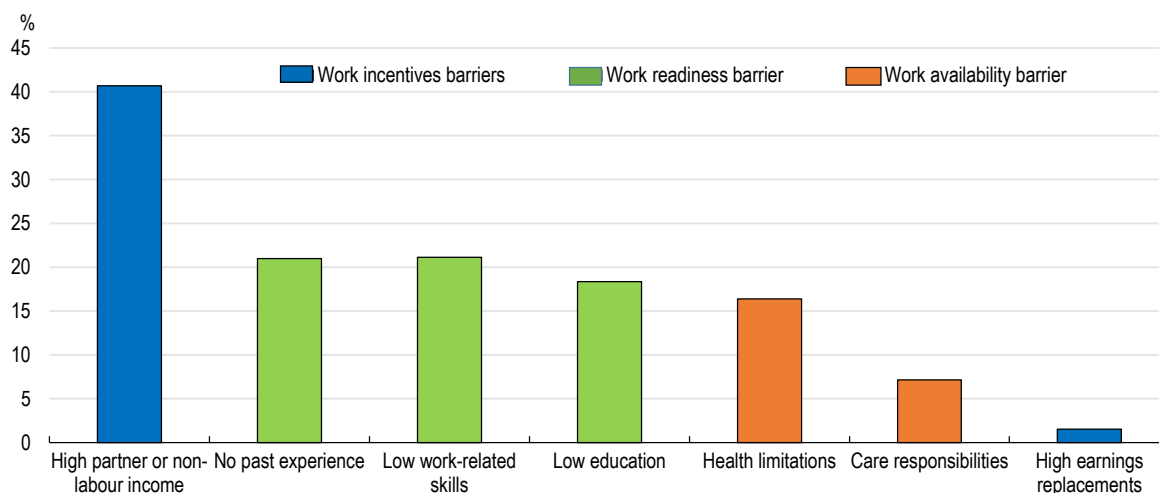
Note: The population experiencing major employment difficulties is defined as those aged 18-64 that report to be long-term unemployed, inactive or to have a weak labour market attachment (an unstable job, restricted working hours or with near-zero earnings), excluding full-time students and those in compulsory military service. The figure indicates the proportion of this population that faces each identified employment barrier. The bars do not sum to 100 as individuals can face multiple employment barriers.
Source: Fernandez et al. (2020). Calculations based on KLIPS 2016.

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Box 2.3. Groups facing major employment barriers in Korea

This box uses the OECD's Faces-of-Joblessness methodology to identify groups of individuals who experience major employment difficulties and face similar combinations of barriers (Fernandez et al., 2020). Major employment difficulties include long-term unemployment, inactivity or a weak labour market attachment (an unstable job, restricted working hours or near-zero earnings). Employment barriers may relate to either work readiness (low education, low work-related skills or no work experience), work availability (health limitations or care responsibilities) or work incentives (generous income-support benefits or a high partner or non-labour income). Statistical segmentation methods are used to identify groups of individuals who face a similar combination of employment barriers. The statistical portraits of the identified groups can then serve as a basis for people-centred policy interventions. In the case of Korea, a third of the working-age population experiences major employment difficulties, slightly above the OECD average of 30%. This group can be divided into nine sub-groups who face broadly similar employment barriers (Figure 2.6):

- *Groups primarily facing work incentives barriers*. Three groups principally face work incentives barriers because of access to high partner or non-labour income sources independent of own work effort. One group is young or in prime-age, in an unstable job and generally living with their parents (Group 1). The second group consists of prime-age women performing domestic tasks (Group 2). The third group comprises older and richer individuals who have built up a long previous employment record (Group 3).

Figure 2.6. Groups facing different combinations of employment barriers
Share facing employment barriers related to work readiness, work availability and work incentives

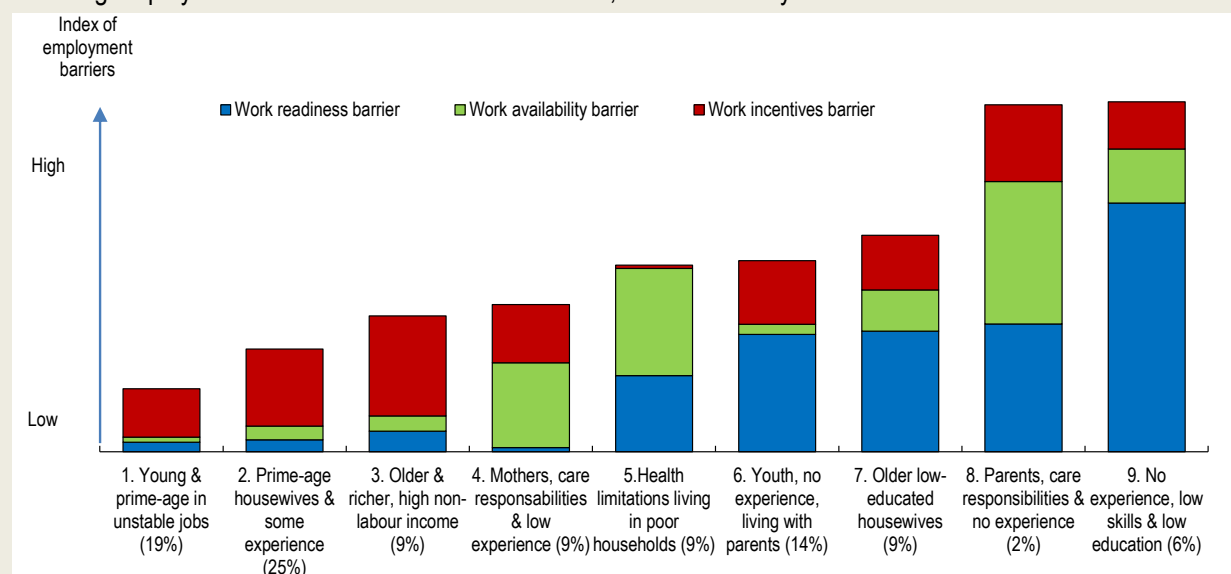Note: The bars refer to the extent the groups face a barrier related to work availability (health limitations and care responsibilities), work readiness (low education, low work-related skills and no past experience) and work incentives (high non-labour income and high earnings replacements), calculated as an average across individual barriers and expressed in relative terms (whether a group faces a barrier less or more compared to other groups). The number in brackets behind each group name indicates the group size as a percentage of the total population experiencing major employment difficulties.
Source: *Fernandez et al. (2020). Calculations based on KLIPS 2016.*

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- *Groups primarily facing work availability barriers*. Three groups predominantly face work availability barriers. For two groups, these barriers relate to care responsibilities, with one group consisting of mothers with low previous work experience (Group 4) and the other parents without past work experience (Group 8). Another group consists of individuals facing health limitations and living in poor households (Group 5).

- *Groups primarily facing work readiness barriers*. Three groups primarily face work readiness problems. Two groups have never worked before, and consist of inactive youth (Group 6) and individuals with low skills and low education (Group 9). The third group comprises older low-educated women performing domestic tasks (Group 7).

- *Job quality is a concern, in particular for older workers*. Many workers earn low hourly wages and work very long hours. They are particularly vulnerable to economic shocks like the COVID-19 crisis. In addition to the impact from the economic slump, older workers are more vulnerable to the disease than younger people. Hence, the government has taken measures to create jobs for the elderly in outdoor or remote positions (Box 2.1). Even outside crisis times, low-pay incidence, defined as the share of full-time workers earning less than two-thirds of gross median earnings, is above the OECD average (Figure 2.7, Panel A). Working very long hours (60 or more per week) is more common in Korea than on average across the OECD for all age groups, and is particularly elevated for older workers (Panel B). This reflects both supply factors related to low wages and concerns about future pensions as well as demand factors related to skills shortages and a limited flexibility of employers to adjust employment and wages in line with business conditions and productivity. The current government is seeking to reduce the high incidence of very long working hours in an effort to improve job quality, health and productivity. Maximum total working hours have been reduced from 68 to 52 hours per week in firms with 300 or more employees as of July 2018 and in firms with 50 to 299 employees as of January 2020 and will be extended to firms with five to 49 employees in July 2021. To increase flexibility, a tripartite agreement was signed on a plan to extend the reference period over which normal working hours can be averaged from three to six months and a reform bill reflecting the agreement is currently pending at the National Assembly. The first phase of the reform targeted at firms with 300 or more employees has contributed to reducing the percentage of individuals working very long hours. Nevertheless, successfully changing Korea's long working-hour culture requires additional efforts to improve the effectiveness of working time regulation and lower incentives to supply and demand long hours (see *Key Policy Insights* and Hijzen and Thewissen, 2020).

Figure 2.7. Many workers earn low wages and work very long hours
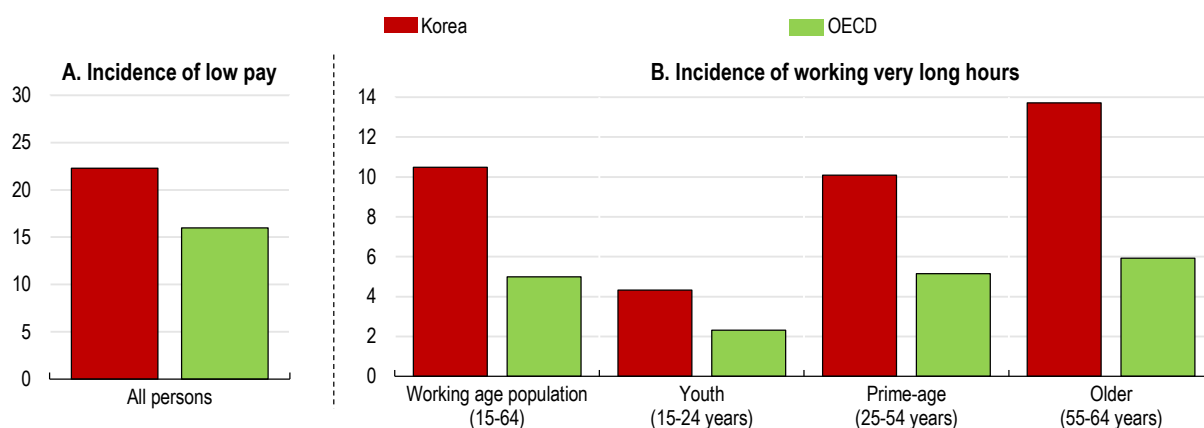
Note: Incidence of low pay: percentage of full-time workers earning less than two-thirds of gross median earnings of all full-time workers. Data refer to latest year available (2014-2018; 2017 for Korea). Average for 33 OECD countries (except NOR, SWE and TUR). Incidence of working very long hours: percentage of workers working 60 or more actual weekly hours. Data refer to 2018. Average for 31 OECD countries (excludes Chile, Israel, Mexico, New Zealand and Turkey). Data for USA refer to dependent employment.
Source: *OECD Earnings Database, OECD Employment database and EU-LFS.*

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Promoting female employment is crucial

Women's employment rate is relatively low past age 30 (Figure 2.8). The COVID-19 crisis may worsen this situation if it leads to a durable decline in job opportunities. Women are over-represented in activities like retail trade, accommodation and restaurants, which are the most affected by the crisis and are likely to recover only slowly. They are also more often than men in insecure jobs. However, there is ample scope to raise female employment, especially as women have increasingly high qualifications, with the highest 25-34 year-olds tertiary graduation rate in the OECD.

Figure 2.8. Women's employment rate is relatively low between ages 30 and 60
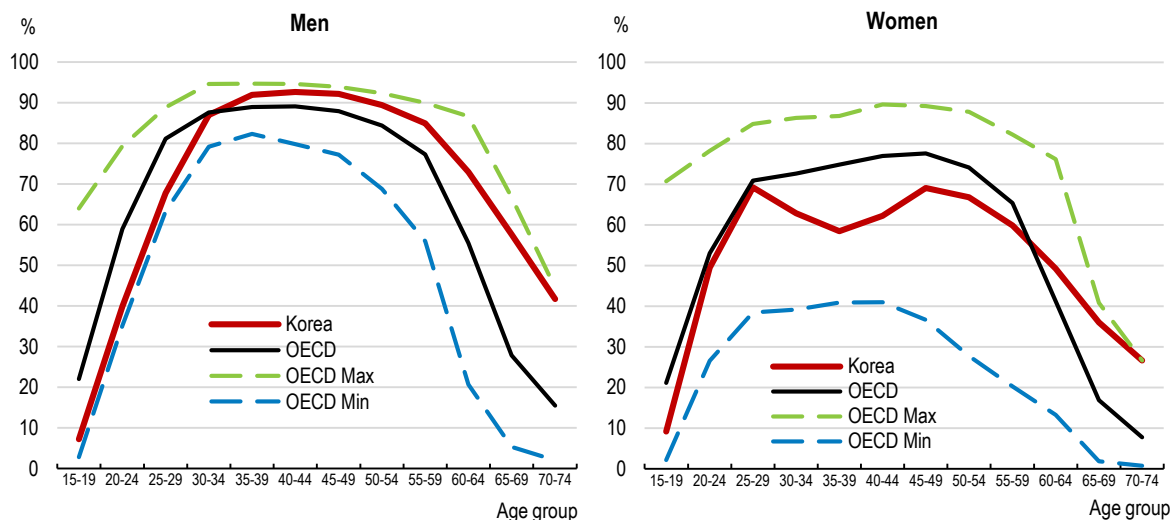
Source: OECD (2019), Employment rate (indicator). doi*: 10.1787/1de68a9b-en (Accessed on 11 December 2019).*

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Many women exit the labour market when they have children. On average, women who did so after the birth of their first child stopped working for three years over the period 2006-15, down from almost six years over the period 1996-2005 (OECD, 2020c), partly reflecting the declining number of children per women. To facilitate mothers' return to work, the government is providing vocational education and training for women who have taken career breaks through Job Centres for women. Nevertheless, in a system with responsibilities and pay disproportionately based on seniority, long career breaks hamper career prospects. Women returning from career breaks for childbirth or childcare often re-enter the labour market as non-regular workers with low-paying jobs, which is a key factor behind the gender wage gap, which is the largest in the OECD, at 34.1% in 2018, as against an OECD average of 13.4% (Figure 2.9). Many mothers with job qualifications are discouraged from returning to work after childbearing by unrewarding job opportunities. Indeed, Korea is one of the few OECD countries for which data are available where the difference in the employment rate between genders increases with the level of education (OECD, 2018b).

Figure 2.9. The gender wage gap is the widest in the OECD
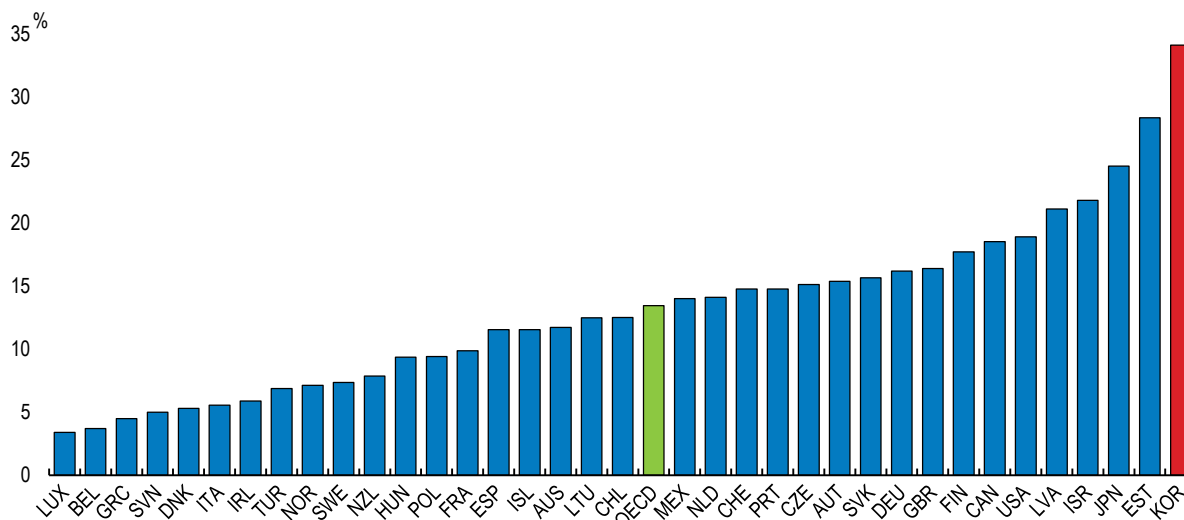
Source: OECD (2019), Gender wage gap (indicator). doi*: 10.1787/7cee77aa-en (Accessed on 11 December 2019).*

Greater transparency about factors determining pay would help reduce gender pay gaps. Korea has an affirmative action programme, which was gradually expanded since its introduction in 2006, and seems to have helped narrowing gender wage gaps. In February 2020, the government launched a salary comparison website for workers in domestic firms, showing salary brackets of private sector employees according to six criteria -- firm size, type of business, occupation, job career, gender and academic background. It could build on these data to provide further analysis of wage differences. For example, the Swedish National Mediation Office issues an annual report analysing the sources of wage discrepancies, which allows separating differences related to age, education, occupation, sector of employment and hours worked from gender discrimination, thereby facilitating corrective action (Swedish National Mediation Office, 2019). Increasing support for potential female entrepreneurs to balance work and family life and obtain financing would help reduce the gender gap in entrepreneurship rates, which was the third highest in the OECD in 2017 at about 12.5 percentage points, compared to an OECD average of around seven (*2018 OECD Economic Survey of Korea*). Policies need to make it easier for mothers to combine careers and family life, in particular through promoting the use of paid parental leave by both parents, boosting the supply of high-quality childcare, improving work-life balance, facilitating mothers' return to work and tackling gender discrimination.

Korean women are entitled to 90 days of paid maternity leave (of which the first 60 are mandatory under the Labour Standards Act and the remaining 30 are covered by the Employment Insurance). However, only 76.5% of female private-sector workers took maternity leave in 2018, notably because many firms are reluctant or unable to fill temporary vacancies. Many women tend to leave the labour market shortly before or after childbirth. Among the reasons cited for career interruptions, "pregnancy and childbirth" accounts for 22.6%. Beyond female labour market participation and career prospects, insufficient access to maternity leave may affect fertility, with a three percentage-point higher probability of having children for women benefitting from maternity leave (Kim, 2018a). The government has recently strengthened its supervision of businesses to ensure enforcement of maternity leave rights, using health and employment insurance data. In addition, many working mothers who are not covered by the Employment Insurance (EI) scheme are now entitled to a flat-rate maternity cash benefit of KRW 500 000 per month for three months. This covers the self-employed, freelancers, and many employees who are not covered by the EI scheme and/or do not meet the maternity benefit eligibility criteria.

Each parent is entitled to a year of paid parental leave, to be taken before the child turns eight, with a replacement rate of 80%, up to a ceiling of KRW 1.5 million (about 40% of average earnings) for the first three months, and 50% subsequently, up to a ceiling of KRW 1.2 million. The effective average replacement rate across the entire one-year leave for a worker on average earnings was 31% in 2019, which is relatively low, compared to Germany, Japan and Sweden, where the replacement rate is around 60% (OECD, 2019a). Parental leave is estimated to increase the probability of a woman's continued participation in the labour market by four percentage points (Kim, 2018a). The second parent taking leave (usually the father) can benefit from three months leave at a payment rate of 100%, up to a ceiling of KRW 2.5 million (about 60% of average earnings). However, fathers whose spouses are unable to take parental leave do not benefit from the higher replacement rate. Amending this rule should be considered. In 2018, about 30 parents per 100 live births (of which 18% were fathers) claimed the parental leave benefit. This compares to more than 70% in Nordic countries and about 90% in Slovenia. A 2018 relaxation of eligibility criteria and the 2019 EI extension are likely to lead to an increase in take-up in the future (OECD, 2020c).

The proportion of fathers among parental leave-takers (regardless of duration) increased from 2.4% in 2011 to more than 21.2% in 2019. Nevertheless, negative perceptions in the workplace and income reduction remain strong obstacles to fathers taking parental leave, particularly in the private sector. Many firms are reluctant to allow parental leave, especially because of difficulties in hiring replacement workers and adapting their organisation. Firms are more willing to grant parental leaves in many other OECD countries. The Korean law provides for the right to maternity leave and the prohibition of discrimination, and the Korean government grants subsidies to firms offering parental leave and reduced working hours for parents, as well as additional subsidies for hiring replacement workers, but awareness remains insufficient.

As the maximum parental leave is fairly long and the effective replacement rate fairly low, allowing higher replacement rates for shorter leaves, as in Germany, may be a way to alleviate the income reduction problem (OECD, 2019a). Encouraging fathers to take parental leave leads to better sharing of household work, even beyond the leave period, supporting female employment. One recent estimate suggests that a 50% increase in her husband's household work increases a woman's probability to continue working by 3.5 percentage points (Kim, 2018a). Improving flexibility in workplace practices, in particular through expanding opportunities to work part-time with remuneration proportional to that of regular full-time workers and allowing greater working-time flexibility would also encourage female employment (OECD, 2019a). This could also help encourage births, as voluntary part-time is associated with a fertility rate that is two percentage points higher relative to full-time work (Kim, 2018a).

The availability of high-quality childcare is essential to support female employment and to limit career breaks. Government support for children aged 0-5 includes vouchers for children enrolled in childcare centres and a home childcare allowance for children not enrolled in the centres. The share of out-of-pocket payments for childcare is among the lowest in the OECD (OECD, 2020c). Participation is high, at over 50% for children aged below three and 93% for those between three and five in 2016, compared to OECD averages of 33% and 86% respectively (OECD, 2019a). The government aims to increase childcare capacity further to allow all children to receive basic childcare during the day and extended childcare at night from March 2020.

Enhancing childcare quality further is a priority. The Nuri curriculum was introduced in 2013 to raise childcare quality and average user satisfaction with childcare centres has increased from 3.7 to 4 on a scale of 5 from 2012 to 2018. Nevertheless, further improvement is needed to ensure high quality across all childcare centres. Hence, the government replaced accreditation upon application by mandatory assessment for all childcare centres in June 2019, increased the number of assistant teachers by about 15 000 in 2019 and is raising early childhood education and care teachers' pay and strengthening their training. Reflecting many parents' preference for public childcare, the government aims to lift its share to 40% by 2021, from around a quarter currently.

Older workers need better jobs

Because of low pension entitlements, partly reflecting the late introduction of the National Pension Scheme (NPS), which was set up in 1988 for companies with more than ten employees and gradually extended to become quasi-universal only in 1999, 58% of men and 35% of women aged 65 to 69 are still working and the average full retirement age is around 72. While Korea ranks 30th in the OECD on the employment rate for individuals aged 25-54, it climbs steadily in the ranking as age increases, reaching the top spot for the 70-74 year-olds (Figure 2.10). However, more than 40% of workers aged over 60 are in non-permanent jobs, compared to less than 20% in the overall working population (OECD, 2018c). A large proportion of older workers also lacks an employment safety net (Figure 2.11).

According to the 2017 Additional Economically Active Population Survey for Older Workers, 58% of workers aged 55-79 work primarily to earn or supplement their living costs. Korea has the highest share of people aged over 65 earning less than half the median household income of the total population. This contrasts with the relative poverty rate of the population aged 18-65, which is only slightly above the OECD average (Figure 2.12). A multidimensional elderly poverty index taking into account assets and housing (area per household member) suggests that old-age poverty may be overstated when only income is considered. According to this index, about a fifth of Korean seniors would suffer from deprivation (Yun and Ko, 2018). This is still a high proportion, asset holdings also mitigate income poverty in other OECD countries, and the area per household member may overestimate the benefits of housing assets for households living in large, but low quality dwellings, particularly in rural areas with limited service availability. Many public sector jobs for older workers are being created. In particular, the government will create 600 000 jobs for the elderly and the socially disadvantaged in outdoor or remote positions, to ensure safety from the COVID-19 virus, in 2020 (Box 2.1). While this alleviates old-age poverty and fills some needs for public service workers, more emphasis should be put on raising the quality of jobs, especially through reducing the weight of seniority in the wage system and reorienting active labour market policies (see below).

Figure 2.10. The employment rate falls more slowly with age than in other OECD countries
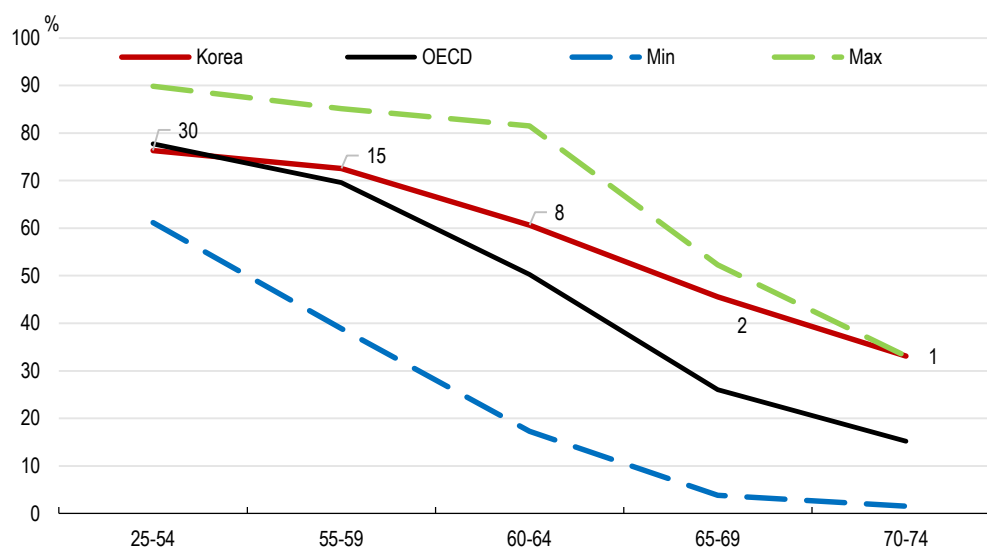
Note: Data labels indicate Korea's employment rate rank in the OECD.
Source: OECD (2018c), *Working Better with Age: Korea, Ageing and Employment Policies*.

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Figure 2.11. Many older workers are excluded from the social safety net

- Wage workers with employment safety net
- Wage workers without employment safety net
- Non-wage workers[1]
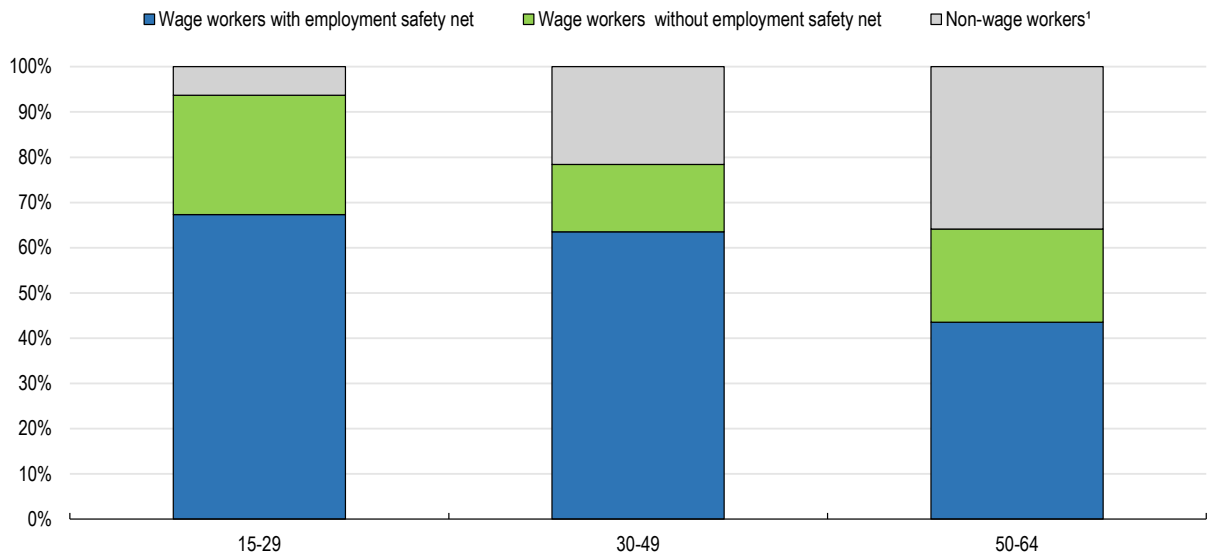
1. Non-wage workers include employers, self-employed and unpaid family workers.
Source: OECD (2018c), *Working Better with Age: Korea, Ageing and Employment Policies*.

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Figure 2.12. The share of the elderly in relative poverty is the highest in the OECD

Poverty rates
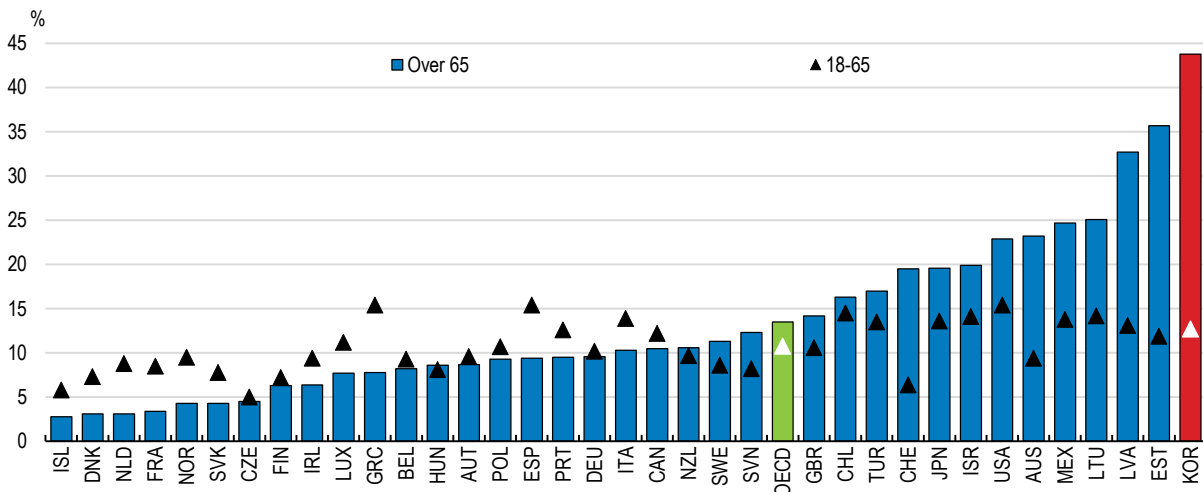
Note: Number of persons living with less than half of the median household income of the total population.
Source: OECD (2019), Poverty rate (indicator). doi: *10.1787/0fe1315d-en (Accessed on 11 December 2019).*

StatLink https://doi.org/10.1787/888934157283

As the NPS matures, pension adequacy will improve. Even so, the net mandatory public and private replacement rate (taking personal income taxes and social security contributions paid by workers and pensioners into account) for an average income earner after 40 years of contribution is fairly low, at 43%,

compared to an OECD average of 59%. Low-income earners (at 50% of average earnings) currently benefit from a net replacement rate of 61%, still lower than the OECD average of 68% (Figure 2.13). Furthermore, as a result of reforms to enhance the financial sustainability, the targeted gross replacement rate will decrease by 0.5 percentage point per year from 45% in 2018 to 40% in 2028 (OECD, 2019b).

Expanding the coverage of the NPS to non-regular workers is another challenge. Excluding those who are not considered workplace-based insured, such as short-time workers, who work less than 60 hours a month, and day workers who work less than eight days a month, coverage was only slightly above 36% for non-regular workers in 2016, compared with nearly 83% for regular workers. The Duru Nuri social insurance support programme, initiated in 2012, grants subsidies covering employer and employee NPS and EI premiums of low-income workers in companies with fewer than ten employees. The subsidy currently amounts to 40% of contributions for previously covered employees, and up to 90% for new subscribers. In order to reduce the deadweight costs, and increase the effect of social insurance, it is necessary to reduce the support for existing insured workers and operate the programme mainly for new subscribers. More efficient collection of social contributions, notably taking advantage of connecting various administrative records, would also help raise NPS coverage (Kim, 2016).

Figure 2.13. Net pension replacement rates are relatively low
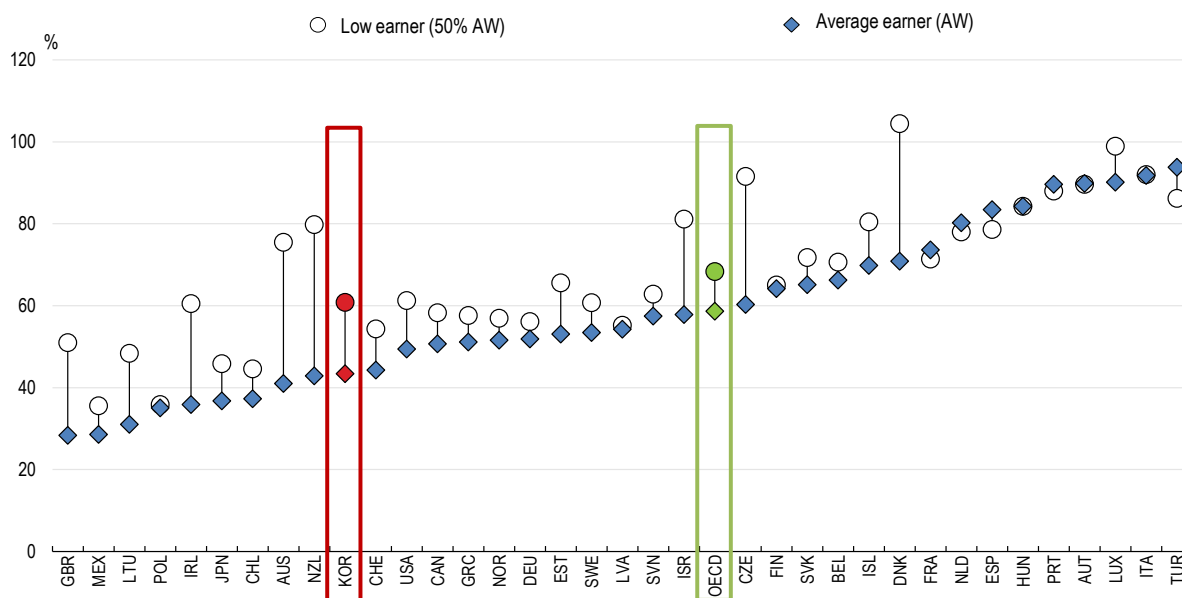
Note: The net replacement rate is calculated assuming labour market entry at age 22 in 2018 and retirement after a full career. The net replacement rates shown are calculated for an individual with 100% and 50% of average worker earnings (AW).
Source: OECD pension models.

StatLink https://doi.org/10.1787/888934157302

Given the short periods of contribution and the low replacement rates, many pensioners rely on the means-tested, tax-financed basic pension, to which 70% of the elderly are eligible. Despite recent increases to up to KRW 300 000 (about USD 260 or less than 8% of average earnings), the basic pension remains very low. It should be increased further and focussed on the elderly in absolute poverty. The Basic Livelihood Security Programme provides means-tested, non-contributory social assistance for people living below the poverty line. However, to turn it into a better instrument against old-age poverty, the family support obligation, which takes into account earnings and assets of a claimant's children and parents to determine entitlements (irrespective of whether they actually provide support), should be phased out, as in other

OECD countries which previously had similar rules, including Austria, Belgium and France (OECD, 2018b). Under the New Deal, the Korean government plans to phase out the family support obligation from the Basic Livelihood Security Programme by 2022 and to expand the level of coverage.

Employees with at least a year of service are entitled to a severance lump-sum payment corresponding to a month of wages for each year of service. Since 2005, the government has allowed the conversion of severance pay into a traditional employee retirement scheme, subject to employee consent (Kim, 2018b). However, employees generally prefer the severance lump-sum, which they can use, for example, to set up a business after mandatory retirement or to finance their children's education. The lack of portability of benefits is a hindrance to conversion into traditional pensions and hampers labour mobility, two issues which have been addressed in the reform of the Austrian severance pay system (Box 2.4).

Box 2.4. Austria: from severance pay to individual savings accounts

Until 2003, Austria had a standard severance pay system under which employees became eligible to a cash payment from their employer in case of dismissal after three or more years of tenure. However, concerns were raised about its ability to provide effective income protection to all workers in the case of job loss, since workers with shorter tenures account for the bulk of dismissals but are not entitled to severance pay. Concerns were also raised about its ability to support robust productivity growth based on the reallocation of workers from less to more productive firms. In particular, the fact that voluntary moves would entail the loss of the severance pay entitlements was thought to discourage mobility towards better paying firms.

To address these concerns, Austria adopted a major reform in 2003, which involved replacing its existing system of severance pay by a system of individual savings accounts, funded through mandatory monthly contributions by employers, which could be used by workers to withdraw severance pay in the case of dismissal. Since contributions are not contingent on dismissal and the funds are linked to the worker rather than their job, the new system no longer reduces hiring and firing by firms or mobility between jobs. Upon retirement, employees can claim the remaining balance in their savings accounts as a one-off cash payment or have it converted into a pension. The latter aspect of the reform was meant to support the growth of the private pillar of the pension system and help prepare it for the challenges arising from population ageing.

A major benefit of the reform has been the increase in coverage by severance pay entitlements in the case of job loss, with all workers on a permanent contract now eligible. A lesson from the Austrian experience is that the implications of the new system for the pension system largely depend on the rules for making withdrawals (e.g. limits) and investing the savings held in the accounts (e.g. capital requirements) (Hofer et al., 2011). There is only limited evidence on the impact of the reform on hiring and firing or on the mobility of workers: while the effects have likely been positive, they do not appear to have been very large (Hofer et al., 2011; Kettemann et al., 2017).

Maintaining very high employment rates of older workers as the pension system matures, which is necessary to support growth and ensure fiscal sustainability, will require improving job quality. The spectacular progress in workforce skills will help, as workers with higher qualifications can better adapt to evolving labour market needs and tend to benefit from better working conditions. Korea has experienced the fastest increase in educational attainment in the OECD over the past decades, with a rise in the share of tertiary graduates from around 20% in the 55-64 age group to around 70% for the 25-34 year-olds. The OECD Survey of adult skills (PIAAC) also reveals much stronger skills in younger generations than in older ones (OECD, 2013a).

Nevertheless, policies will also need to support older workers' employment. Even though pension adequacy will improve as the pension system matures, incentives to work until an advanced age will remain fairly strong (see below). Conversely, incentives for firms to retain older workers are still weak. Incentives for workers and employers to ensure that workers stay longer in their career jobs need to be strengthened. The minimum mandatory retirement age that firms can set was raised to 60 in 2016-17. It is necessary to analyse the employment effects of the 2016-17 extension of the minimum mandatory retirement age to 60 and find ways to encourage employers to retain workers in their main job longer. In the long term, the retirement age should be gradually pushed up further, to beyond 65 as in most OECD countries. Measures to prevent circumvention through "honorary retirement" may be necessary. An obstacle to retaining older workers is the seniority-based wage system, which opens a gap between wages and productivity at older ages. Korea, like Japan, has much steeper wage increases in relation to age beyond the mid-30s or early-40s than most other OECD, countries, for example Germany or the United States (Figure 2.14).

In recent years, over half of the companies with over 300 employees have adopted the wage peak system, which freezes or gradually reduces the wages of older workers, with partial compensation through government subsidies granted to the employee. However, the wage peak system has met opposition from some workers and trade unions, as the current wage structure provides relatively high earnings to workers at the time they have to pay for their children's education, support their parents and make contributions for their retirement (OECD, 2018c).

Japan and Singapore have promoted employment of older workers through re-hiring policies. In Japan, employers with a mandatory retirement age below 65 were required to introduce one of the following measures from 2006: i) raise the mandatory retirement age to at least 65; ii) abolish mandatory retirement; or iii) retain or re-hire workers who wish to continue working until age 65. A large majority of companies of all sizes have chosen the third option. This policy has contributed to raise the employment rate of older workers, albeit at a cost in terms of job quality, work satisfaction and well-being. Workers reaching the mandatory retirement age are generally re-hired as non-regular workers and suffer large wage cuts, for many in the order of 40%. While wage cuts partly reflect changes in job responsibilities, many older workers find these wage cuts excessive. Moreover, systematic re-hiring of older workers in lower positions may be detrimental to productivity, as some may not be able to fully use their skills in their new job or become less motivated (OECD, 2018d, Jones and Seitani, 2019). In Singapore, since 2012 employers must offer medically fit employees with satisfactory performance reaching the retirement age (currently 62) re-employment up to the Re-employment Age (currently 67), though the job and salary may change. The re-employment system has allowed older workers' employment to rise, while preserving firms' competitiveness. It is complemented by policies to enhance the quality of employment for older workers, including financial incentives for employers to redesign jobs and adopt age-friendly workplace practices, government support for building capability in human resource management, and public education initiatives to raise the employability and productivity of older workers (WEF, 2017). In 2019, the Tripartite Workgroup on Older Workers formed by the government, employers and trade unions recommended to gradually raise the retirement age and the re-employment age to respectively 65 and 70 by 2030, as well as additional measures towards more inclusive workplaces, including structured career planning, transformational job redesign and better opportunities for part-time re-employment (Tripartite Workgroup on Older Workers, 2019).

The ultimate objective should be a flexible wage system based on performance and job content and skills requirements (*2018 OECD Economic survey of Korea*). The government has limited direct influence on wage-setting arrangements negotiated at the firm level, but can cooperate with the social partners to promote mutually beneficial deals and new qualification frameworks to align wages with job requirements and skills, possibly using transitory compensation to minimise the current cohort of workers' potential loss of lifetime earnings (OECD, 2018c). The government should push ahead in this direction, through adjusting the institutional framework and providing market wage information.

Technological progress calls for re-skilling and up-skilling. The COVID-19 crisis will speed up the move towards digital technologies and labour reallocation across sectors, which intensifies the need to upgrade skills. Workers need to participate in lifelong learning to retain or enhance their employability. Participation of workers aged 55-64 in training is below the OECD average and the unmet training needs are the largest among the countries for which data are available. More than a fifth of workers aged 55-64 were willing to participate in training, but did not (Figure 2.15). Being too busy at work was cited as the main reason by almost 40% (OECD, 2018c).

Figure 2.14. Wages reflect seniority more than in most other OECD countries

Age-earnings profiles in Korea compared with selected OECD countries (latest available year), Index, 25-29 year-olds = 100
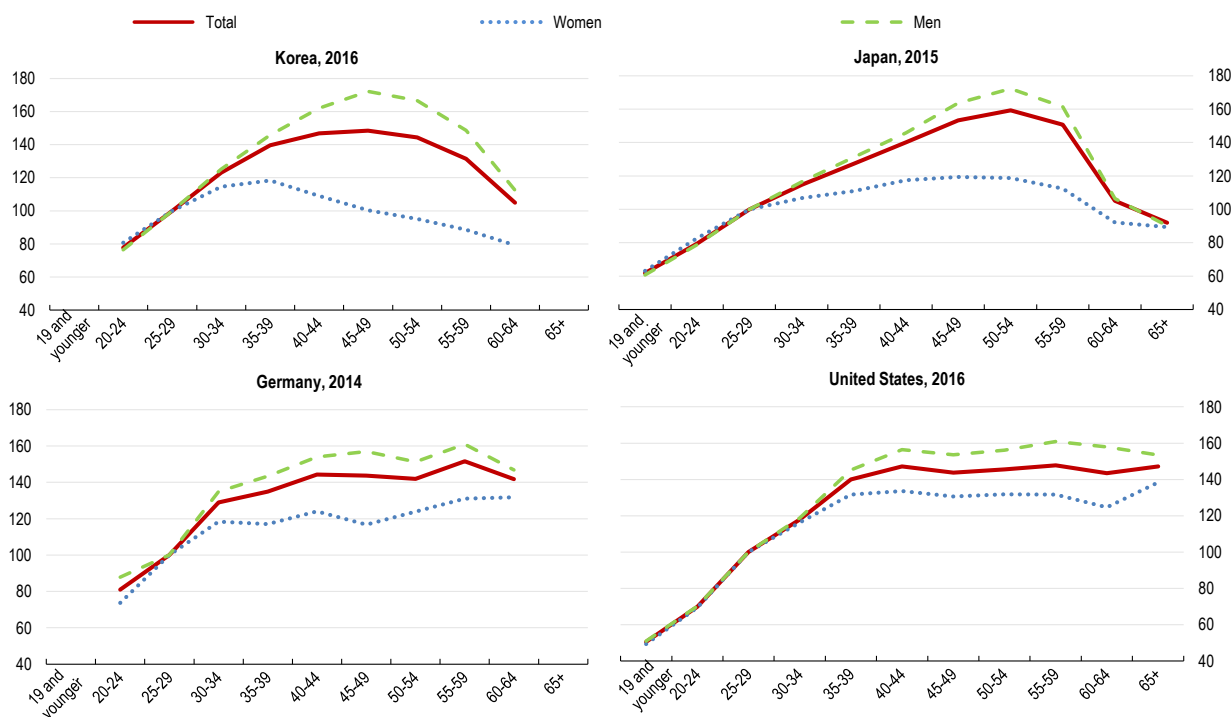
Source: OECD (2018b), *Towards Better Social and Employment Security in Korea, Connecting People with Jobs*.

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The uptake of training needs to be increased, especially in SMEs, for example by providing, in conjunction with the Public Employment Service, programmes that would help firms find adequate replacement workers (OECD, 2020c). Developing further labour market-relevant training is essential. The government is providing tailored training programmes to help older workers adapt to new technologies and enhancing education programmes on core technologies and skills in Polytechnic Universities, as well as other universities and public institutions at the regional level. The National Learning Card introduced in January 2020 by integrating and reorganising previously separate unemployed and incumbent individual learning cards, reduces the blind spot in vocational training for older workers and other disadvantaged groups, and allows individuals to design their own learning plan on a long-term basis. It will be important, however, that adequate career guidance is provided to individuals so that they can take informed training decisions.

Figure 2.15. Many older Korean workers would like to get education and training

Population aged 55-64 participating in education and training or expressing an interest in training but not actually participating, 2012
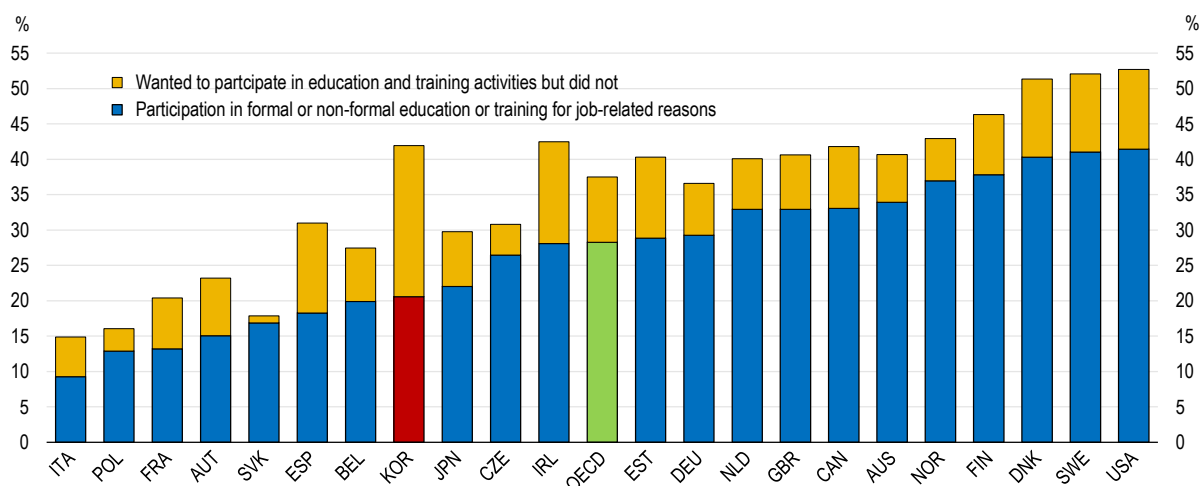
Source: OECD (2018c), *Working Better with Age: Korea, Ageing and Employment Policies*.

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Formal recognition and validation of competences acquired through different channels, including non-formal education and informal learning, is crucial, especially in a society with a strong focus on academic credentials (OECD, 2020d,e). The new National Competency Standards (NCS) is an important tool in that respect, and the government is already operationalising and promoting the effective use of the NCS and introducing monitoring instruments. The government has also institutionalised the participation of industry and workers in the process of developing and improving the NCS. However, the NCS has been underutilised in promotion and wages, and more efforts and time will be needed to ensure it takes root in workplaces. This will require continuous government monitoring and management.

Healthy ageing is essential to enhance the contribution of older workers to the economy and the well-being of the elderly. The health and long-term care system will need to adapt to the evolution of needs related to ageing. Korean health care has made spectacular advances over the past decades, as illustrated by its very effective response to the COVID-19 outbreak. It provides universal coverage and contributes to Koreans having one of the highest life expectancies in the world. Long-term care insurance was introduced in 2008. However, the current hospital-based system is not well equipped to deal with chronic diseases and multiple morbidities associated with ageing (OECD, 2013b). Korea has the second longest length of stay in hospital in the OECD behind Japan (OECD, 2019c). Strengthening primary care would limit avoidable hospital admissions, reduce the length of hospital stays and ensure better monitoring of chronic conditions. The use of electronic medical records, which the government has been promoting, can help in that respect (Kwon et al., 2015). Non-face-to-face medicine also offers opportunities for monitoring chronic conditions (Oliveira Hashiguchi, 2020). Reinforcing prevention, notably measures to discourage smoking and excessive alcohol consumption, would also favour healthy ageing (OECD, 2016).

Raising employment would counteract the projected fall in trend GDP

According to OECD long-term projections, Korea's potential GDP per capita growth will fall from an average of nearly 3% between 2005 and 2020 to an average of 1.2% from 2020 to 2060 (Guillemette et al., 2017). About half of this fall is due to the decline in the share of the working-age population, with the remainder accounted for by slower increases in the employment rate, less capital deepening and weaker productivity, despite Korea's expected convergence towards the best-performing OECD economies. These projections pre-date the COVID-19 crisis, which may affect Korea's growth potential, although to an extent which is too early to assess. A protracted global crisis would lower productivity through lower capital intensity due to a lack of physical investment and through lower efficiency due to a lack of intangible investments and the reorganisation of global value chains. Prolonged unemployment may also affect the productive capacity of workers, and result in labour-market participation remaining depressed for a protracted period. While in the OECD long-term projections, Korea is expected to continue catching up with higher-productivity OECD members, the shrinking share of the working age population will have a stronger negative impact on Korea than on the average OECD country. To some extent, the slowdown in GDP per capita growth is inevitable, as population ages and the income gap with the top OECD countries shrinks, reducing opportunities for rapid catch-up. However, Korea can achieve higher growth than in the baseline scenario, by raising its employment rate and productivity.

This section explores various scenarios, using the OECD long-term model (Guillemette et al., 2017; Guillemette and Turner, 2018). The baseline incorporates a reduction of the gender employment gap from about 18 percentage points currently to 6 percentage points in 2060, based on education and societal trends. Assuming unchanged male participation, fully closing the gap would raise GDP per capita by 4.5% compared to the baseline in 2060 (Table 2.1). The youth employment rate is also relatively low. Lifting it to the OECD average would add more than 3% to GDP per capita by 2060. Even though, as noted above, the baseline scenario is more uncertain than ever, deviations from the baseline are likely to show little sensitivity to changes in the baseline.

The importance of employment rates in different population groups for the aggregate employment rate and GDP growth can also be illustrated by applying employment rates from other countries to the structure of the Korean population.

- With the same employment rates in each age group as Japan, Korea's employment and GDP per capita would be about 9% higher than the baseline in 2060, as female employment in most age groups and male youth employment would be higher.
- Assuming that Korea moves to the highest employment rate in the OECD in each age group for both men and women raises GDP per capita by nearly 25% by 2060. This scenario provides an upper bound to the potential impact of increasing employment rates, insofar as it is unlikely that a country could have the highest employment rates in all age groups, not least because individuals entering the labour market earlier may also retire earlier.

A second set of simulations explores the impact of increases in productivity related to a reduction in economic duality. Raising SMEs' average productivity from its current level of about a third of that of large firms to half, which corresponds to the OECD average, would lift GDP per capita by more than 40% in 2060, amounting to an increase in the 2020-60 annual growth rate of 0.9 percentage points. Raising services productivity from about 45% of that of industry to the OECD average of 85% by 2060, would increase GDP per capita by nearly 60% in 2060, or equivalently raise the 2020-60 annual growth rate by 1.2 percentage points.

Table 2.1. Long-term scenarios: GDP growth and employment

	GDP per capita	Potential employment	Employment rate
	Deviation from baseline in 2060		
	Per cent		Percentage points
Alternative employment scenarios			
Closing gender employment gap	4.5	4.7	3.2
Raising the youth employment rate to the OECD average	3.3	3.4	2.3
Employment rates as in Japan	9.2	8.8	6.0
Employment rates at OECD maximum	24.6	23.6	16.1
Alternative productivity scenarios			
SME's relative productivity raises to OECD average	41.7	0.0	0.0
Service sector's relative productivity raises to OECD average	59.7	0.0	0.0
Closing the gender wage and employment gaps	17.8	4.7	3.2
Closing half of the old age wage gap	6.1	0.0	0.0

Source: OECD calculations based on the OECD Long-term model.

If women could get better access to more productive jobs (proxied by higher wages), aggregate productivity and hence GDP per capita would increase. Under the assumption that the gender employment gap fully closes, GDP per capita is nearly 18% above the baseline in 2060.

Another way to lift output would be to boost the productivity of older workers, through enhancing lifelong learning, while discouraging early retirement from career jobs, which pushes workers toward lower-productivity jobs. Closing half of the wage gap between older workers and those aged 45-49 by 2060, assuming a corresponding increase in productivity, would raise GDP per capita by about 6% in 2060.

The alternative scenarios for employment or productivity are largely overlapping, preventing their aggregation into a single result. As noted earlier, the scenario where employment rates reach the maximum OECD level in every age category is likely to be an upper bound for employment-related increases. Similarly, the increase in service sector productivity would require higher productivity of SMEs and of most categories of workers. It likely constitutes an upper bound for productivity-related increases in GDP per capita, at 1.2 percentage points.

Combining the most optimistic scenarios for employment and productivity raises 2020-60 average annual GDP per capita growth by 1.8 percentage points. A less optimistic scenario, which would combine the employment rates of Japan with a catch-up of SMEs to OECD average productivity levels, would raise annual 2020-60 average GDP per capita growth by 1.1 percentage points.

The rising old age dependency ratio will increasingly strain public finances

The OECD long-term baseline scenario has total primary (excluding interest) government expenditure rising by over 10 percentage points of GDP by 2060 (Table 2.2). Health and pension expenditure account for more than half of the increase. The rise in pension spending essentially stems from the growing number of retirees, but is also sensitive to the pension indexation assumption. The baseline scenario assumes that pension benefits in Korea and other non-EU countries grow at an equally weighted average of price and wage inflation. This may overstate the increase for Korea, as pension uprating is currently based on price inflation. Assuming that price indexation prevails until 2060, the increase in pension spending from 2020 to 2060 would be only 0.7 instead of 2.3 percentage points of GDP in the OECD long-term model.

Table 2.2. Long-term scenarios: Government expenditure and revenue

	Public health expenditure	Public pension expenditure	Other primary expenditure	Total primary expenditure	Total primary revenue
	Percentage points of GDP				
Baseline					
Change 2020-60	3.2	2.2	4.9	10.4	8.4
Deviations from baseline in 2060	Percentage points of GDP				
Alternative employment scenarios					
Closing gender employment gap	-0.1	-0.2	-1.3	-1.6	-1.5
Raising the youth employment rate to the OECD average	-0.1	-0.2	-0.9	-1.2	-1.1
Employment rates as in Japan	-0.2	-0.4	-2.3	-2.9	-3.0
Employment rates at OECD maximum	-0.5	-1.1	-5.4	-6.9	-7.0
Alternative productivity scenarios					
SME's relative productivity raises to OECD average	0.6	-0.9	0.0	-0.3	0.4
Service sector's relative productivity raises to OECD average	0.8	-1.1	0.0	-0.4	0.6
Closing the gender wage and employment gaps	0.1	-0.5	-1.3	-1.7	-1.4
Closing half of the old age wage gap	0.1	-0.2	0.0	-0.1	0.0

Source: OECD calculations based on the OECD Long-term model.

Pressure for higher increases may, however, build up over time as indexation to prices implies, all else equal, a continuous decline in the ratio of pension income to work income, which is already very low in Korea. Public health expenditure is projected to rise by more than three percentage points of GDP between 2020 and 2060. The increase in primary expenditure other than pensions and health reflects the higher share of output needed to maintain a constant level of public service per capita when the employment-to-population shrinks (Guillemette and Turner, 2017). The increase in total primary revenue is generated endogenously to stabilise gross government debt around 45% of GDP in the long run. The fiscal response to the COVID-19 crisis will increase government debt to an extent which will depend on the depth and length of the downturn (Chapter 1). This will require either allowing government debt to stabilise at a higher level, which would be possible without jeopardising sustainability since 45% of GDP is low by international standards, or raising taxes once the economy has recovered.

Improving job matching for youth and foreigners' workforce contribution

Less than half of youth aged 15-29 were employed before the COVID-19 crisis, the fifth lowest share in the OECD. Youth employment has fallen rapidly since February 2020, particularly in the service sector, and is expected to contract further over the coming months. The generation currently entering the labour market is likely to suffer scarring effects. A year delay in job entry is estimated to lower the average wage over ten years by up to 8%. Lower initial wages due to unfavourable economic conditions also show strong persistence (Han, 2020a). The pre-crisis low youth employment rate reflects long studies, as more than two-thirds of youth obtain tertiary degrees, but also slow transition from education to employment. Labour market duality encourages young people to extend formal or informal education in the hope of joining large firms or the public sector, rather than SMEs, which often suffer from a shortage of skilled workers. The COVID-19 crisis is likely to exacerbate this phenomenon, as the number of jobs offered by large firms is likely to shrink, while preference for job security is likely to increase even further. Measures to further support youth employment in the wake of the crisis and limit scarring effects could include gathering evidence on the impact of the crisis by age group to inform decision making, anticipating the distributional effects of policy action across different age cohorts, updating policies in collaboration with youth stakeholders and providing targeted services for the most vulnerable youth populations (OECD, 2020f).

To address skills mismatches, the government has stepped up career counselling, developed apprenticeships and vocational education (notably Meister schools) and introduced incentives for tertiary education institutions to propose more market-relevant degrees. In the context of the COVID-19 crisis, additional funds will be allocated to job training programmes and the creation of jobs for young adults (Box 2.1). An ambitious plan to support youth employment was announced in March 2018, extending previous measures, but also representing a shift from indirect measures, such as job subsidies, to steps directly benefitting youth, like tax exemptions and in-work benefits (OECD, 2019d). Career guidance and counselling will need to be developed further, in particular through increased resources for the public employment service (see below) and stronger involvement of employers. Creating a one-stop-shop online portal for career guidance to replace the various websites currently available would also help (OECD, 2020e). Developing job opportunities would also improve young Koreans' life satisfaction and possibly facilitate family formation and raise the fertility rate. Importantly, efforts to promote youth employment should complement, rather than substitute for policies to increase older workers' employment, as OECD evidence shows that older workers do not crowd out youth (Box 2.5).

Foreign-born accounted for only about 3% of the Korean population in 2016 and for 3.7% of the economically active population. These shares are among the lowest in the OECD. Nevertheless, temporary foreign workers alleviate labour shortages in some sectors, notably manufacturing SMEs, where they make up 10% of total employment. Around 10% of companies with more than five employees recruit foreign workers (OECD, 2019e). The Employment Permit System (EPS) has been successful in providing low-skilled, fixed-term workers to Korean firms, while protecting local workers from competition and substitution effects. It has also allowed the permanent settlement of ethnic Korean Chinese, primarily employed in services and construction.

However, EPS workers are allocated to an employer and job mobility is allowed only in the event that a worker cannot continue to work at the workplace for any reason not attributable to himself (e.g. illegal employment practices, company closure) and sector mobility is impossible. This prevents EPS workers from getting better jobs and pay and reduces employers' incentives to improve their working conditions. Maximum duration of stay has been extended from three to ten years in several steps, as employers were keen to retain experienced workers. Nevertheless, EPS workers are still generally not eligible for income support from the Basic Livelihood Security Programme (BLSP) and the earned income tax credit (EITC). Although a possibility for skilled EPS workers to get an indefinitely renewable visa was opened in 2011, very few can meet the requirements. The rapid rise in educational attainment implies that Korean low-skilled workers will become increasingly scarce. Even though automation may reduce demand for low-skilled workers, foreigners are likely to be needed to fill some positions. The job mobility system for foreign workers should be gradually adapted to enhance their contribution to the Korean economy, to enhance their contribution to the Korean economy, while continuing to shield local workers from undue competition. Foreigners with permanent residence should also be granted access to the BLSP and EITC.

Box 2.5. Do older workers crowd out youth?

It is often believed that older workers' early retirement creates employment opportunities for youth. But past policies to promote early retirement in the hope of lifting youth employment in OECD countries have proven ineffective. In fact, there is a positive relationship between the employment rates of old and youth across OECD countries (Figure 2.16). Underlying reasons are that demand for labour is not fixed (the so-called "lump of labour fallacy") and that youth and older workers, having different skills and experience, tend to be complements rather than substitutes. Panel regressions across 25 OECD countries, including a range of controls for economic and labour market conditions, policies and institutions and differences in skills across generations, confirm that the relationship is not the result of exogenous factors affecting the employment rate of both groups. Moreover, the relation is not affected by the business cycle (OECD, 2013c).

However, concerns that delaying the mandatory retirement age may reduce youth employment persist in Korea, partly due to two Korean labour market specificities. The first is the cost of older workers in the seniority-based wage system, which may exceed their productivity, affecting companies' competitiveness and therefore their ability to hire younger workers. The second is the competition between generations for high-quality jobs in the public sector and large firms, which are in limited supply (Hwang, 2013). The mandatory retirement age of 60 implemented in phases since 2016 is estimated to have increased employment for older workers (aged 55 to 60), but lowered the number of youth (aged 15 to 29) employed in private companies. At the company level, when one worker can benefit from the postponement of the retirement age, the number of older employees increases by 0.6, while the number of youth employed decreases by 0.2. The increase in elderly and decline in youth employment is particularly large in companies with over 100 employees and those with a low initial retirement age (Han, 2020b). To mitigate potential adverse side-effects on youth employment, extending working careers needs to be complemented by reforming the wage setting system and addressing labour market duality.

Figure 2.16. Youth and elderly employment rates are positively correlated

Employment rate 15-24 (%)

$y = 0.84x - 11.11$
$R^2 = 0.41$

Employment rate 55-64 (%)
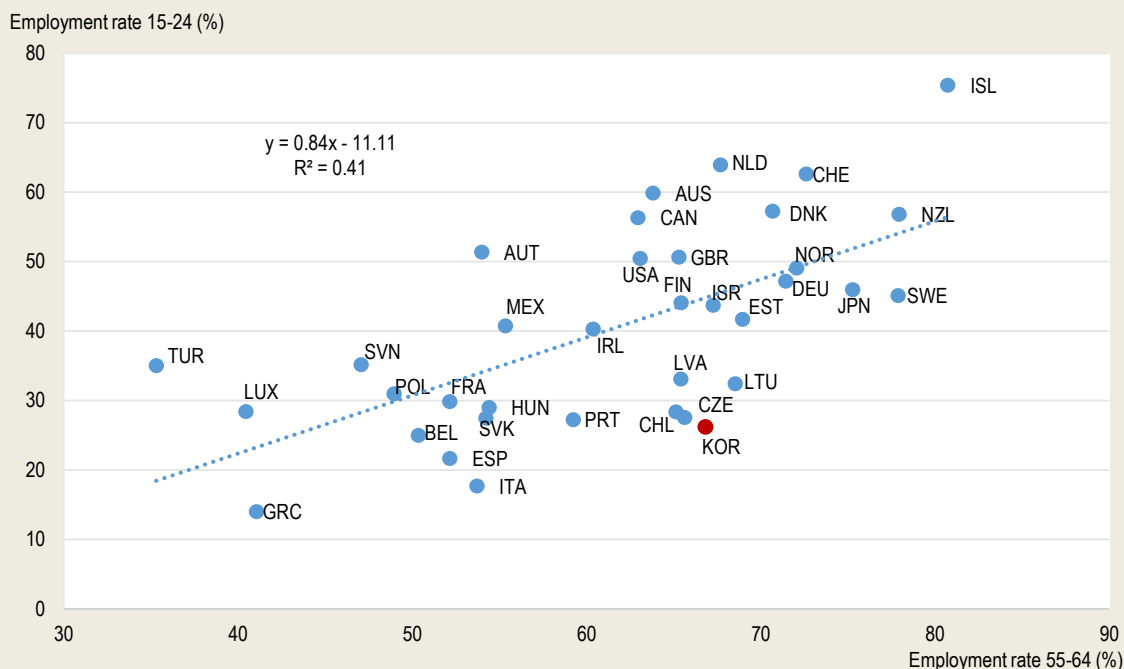
Source: OECD (2019), Employment rate by age group (indicator). doi: 10.1787/084f32c7-en (Accessed on 11 December 2019).

A more flexible labour market should be combined with stronger social protection

Beyond the measures aimed at raising employment in specific groups outlined above, a more flexible labour market would help reduce duality in the labour market and direct workers towards their most productive employment, which would alleviate shortages of skilled workers in SMEs. Easing employment protection for permanent workers, once the recovery from the COVID-19 crisis is well entrenched, would encourage firms to hire regular workers, as they would face lower costs in case of being subsequently forced to reduce staff. Reinforcing social protection, notably unemployment insurance, as well as active labour market policies, including job counselling, training and upskilling, would allow workers to smoothly transition from one job to another. In turn, more efficient reallocation of labour would raise productivity (see Chapter 3).

Reducing labour market duality is crucial to foster inclusive growth

The Korean labour market is characterised by strong duality, which affects older workers disproportionately (OECD, 2018c). Non-regular workers, which include temporary, part-time and atypical (e.g. daily workers, contractors, temporary agency) workers, account for about a third of salaried workers. For nearly half of them, being a non-regular worker is not their first choice (OECD, 2018b). Besides, non-salaried workers (self-employed and unpaid family workers) make up about a quarter of the employed population, well above the OECD average of about 15% (Figure 2.17). The COVID-19 outbreak highlights the vulnerability of non-regular workers. In the year to June 2020, while total employment declined by 1.3%, the employment of temporary employees and daily workers dropped by respectively 8.3% and 5.8%.

Reducing labour market duality requires reducing incentives for firms to employ non-regular workers, notably the need for flexibility and the lower labour costs (*2018 OECD Economic Survey of Korea*). Flexibility could be enhanced by lowering employment protection for permanent workers, which is relatively strong (Figure 2.18). An obstacle to reducing employment protection in Korea is the weak social safety net. To enhance labour flexibility and promote inclusive growth, policies will need to shift from protecting jobs to protecting workers (OECD, 2018a). Another important obstacle to labour mobility in Korea is the seniority-based wage structure, which will need to be gradually replaced by a more job and performance-based structure, as discussed above.

Figure 2.17. The share of non-regular employment is high

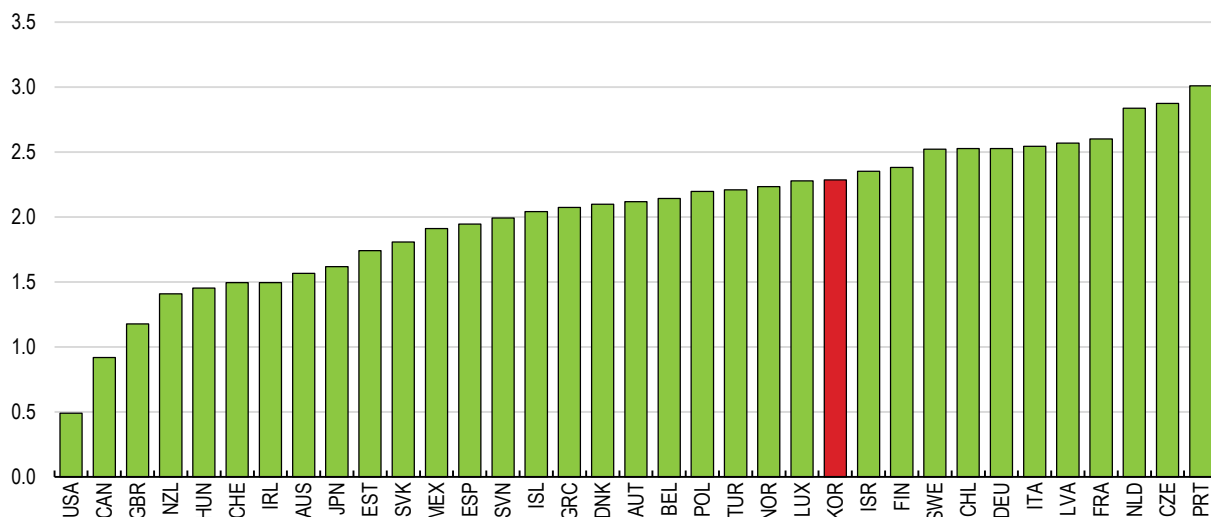A. Temporary[1]

B. Self-employed
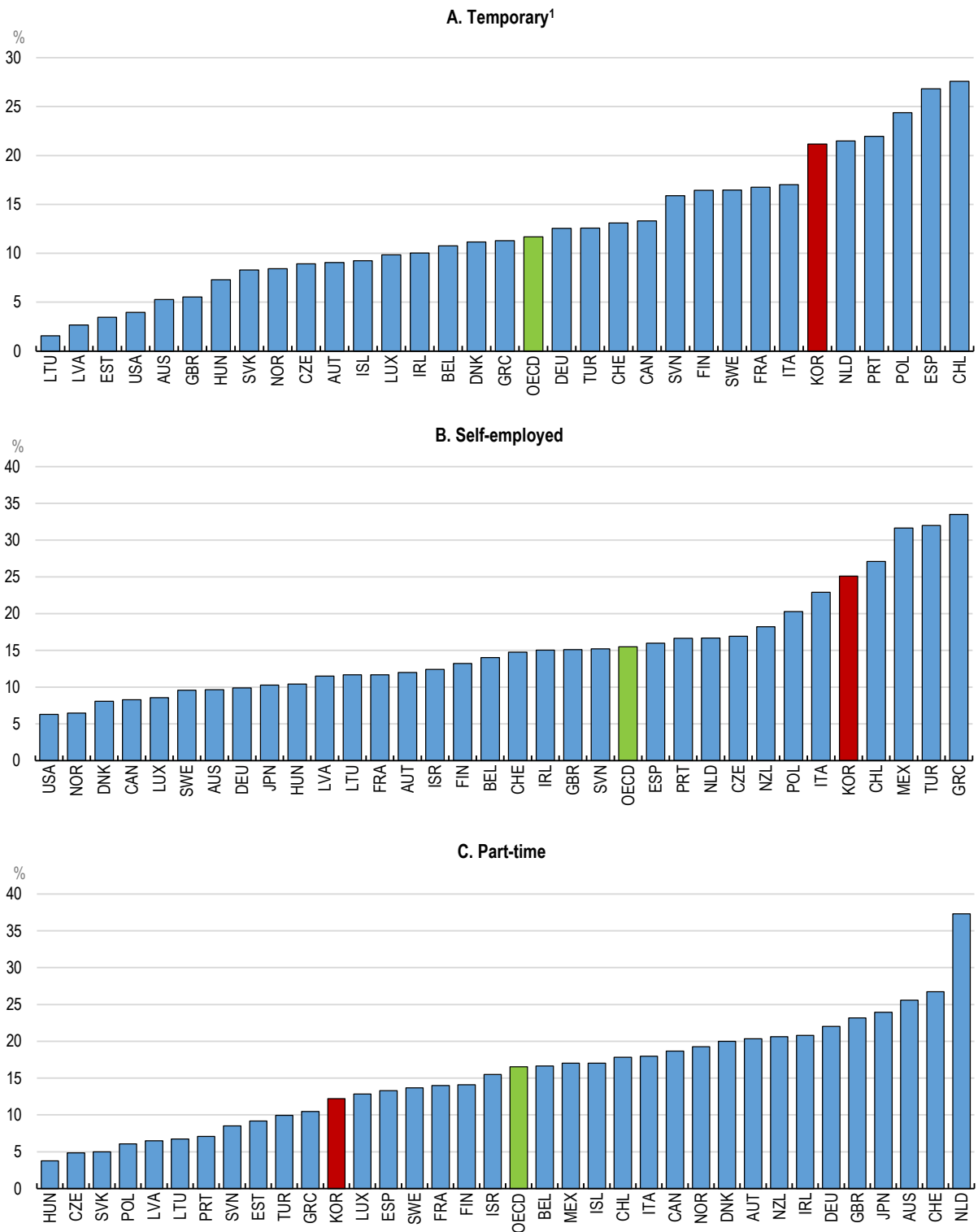
C. Part-time

1. Per cent of dependent employment.
Source: OECD (2019), Temporary employment (indicator). doi: 10.1787/75589b8a-en; OECD (2019), Self-employment rate (indicator). doi: 10.1787/fb58715e-en; OECD (2019), Part-time employment rate (indicator). doi: 10.1787/f2ad596c-en (Accessed on 11 December 2019).

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Figure 2.18. Permanent workers' employment protection is relatively strong

Index of protection of permanent workers against individual dismissals, 2013

Note: The index ranges from 0 (no regulation) to 6 (detailed regulation).
Source: OECD (2018c), Working Better with Age: Korea, Ageing and Employment Policies.

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Social protection remains weak despite recent reforms

Only about 43% of the unemployed receive benefits. Exceptional government emergency measures to support households during the COVID-19 crisis (Box 2.1) mitigate hardship. However, raising coverage on a more permanent basis would be desirable. While nearly 95% of regular workers were covered by employment insurance (EI) in 2018, coverage among non-regular workers, although on an upward trend, was only 71%, which is problematic given their vulnerability (*2018 OECD Economic Survey of Korea*). The low EI coverage of non-regular workers both entails a high risk of poverty and hampers the reallocation of workers towards more productive jobs, which is essential to sustain productivity growth (Adalet McGowan and Andrews, 2015). The legal coverage of EI has been gradually extended over the years, but compliance remains an issue for non-regular workers. The Duru Nuri social insurance support programme described above has increased coverage somewhat, but at a high deadweight cost. Since 1995, legislation enables undocumented workers to claim EI benefits to which they should have been eligible if contributions had been properly made and there were 22 000 claims in 2018.

Raising EI coverage further requires better legislation enforcement and premium collection. Employers that employ workers eligible for Employment Insurance, but fail to report their employees' insured status are subject to a fine for negligence. In 2018, a fine for failure to report workers eligible for the insurance was imposed in about 85 000 cases. However, penalties for failing to register employees with EI are low, at KRW 30 000 per unregistered employee (about USD 25). A recent change in premium collection procedures is likely to facilitate EI enforcement. Since 2017, the Korea Workers' Compensation and Welfare Service (KOMWEL), which already administered industrial accident compensation insurance, where the coverage of non-regular workers is above 90%, was tasked with the management of the EI insured. The KOMWEL calculates and imposes EI premiums, which are collected by the National Health Insurance Service, like all other social insurance premiums.

Helping workers with health problems stay in employment is essential, both from an employment and well-being perspective. Korea has no statutory (or a coherent privately-regulated) cash sickness benefit, despite the option for such a benefit in the National Health Insurance Act and some specific initiatives, such as Seoul municipality's paid sick-leave policy since 2019 and the recent measures taken in the context of the COVID-19 outbreak. Employees who are (self-)quarantined or hospitalised due to COVID-19 are entitled to paid leave from the employer or living allowance from the government (KRW 1.23 million per month (about USD 1 000) for a four-member households). For quarantine cases, the government can reimburse the cost of paid leave to the employer from 17 February 2020 (up to KRW 130 000 per day). Workers may have to quit their job in case of sickness and many may not regain their original job and may face difficulties in finding a new one. Employers in most OECD countries are liable to pay all or part of their absent workers' wages for a specified period, generally between a week and a month, but up to two years in the Netherlands. Introducing such a mechanism in Korea could secure a minimum level of protection for all salaried workers. In addition to a period of employer liability, most OECD countries provide cash sickness benefits, usually through social insurance, financed by premiums collected from both employers and employees, either within health insurance, as in most OECD countries, or within EI, as in Canada and Ireland. Sickness benefits should be complemented by a strong focus on rehabilitation and return to work, including clear protocols defining the rights and duties of workers, employers, doctors and insurance authorities, and regular work capacity assessments (OECD, 2018c). Given the examples from other OECD countries, Korea also needs to consider a similar system for workers with health problems to secure their income and employment during the treatment. The New Deal includes a sickness benefit implementation study in 2021 and a pilot project for households, including low-income families, in 2022.

Another challenge is reducing in-work poverty. The government has hiked the minimum wage by nearly 30% over 2018-19. It reached about 58.6% of the median wage in 2018, which is relatively high among the OECD countries with a minimum wage. The rapid increase is likely to have weighed on employment in SMEs, despite subsidies to help them adjust. The minimum wage hike has been set at 2.9% for 2020 and 1.5% for 2021. The coverage of the earned income tax credit (EITC) has been increased several times since its introduction in 2008, most recently in late 2019, through lower qualification requirements: abrogation of the minimum age; a hike in the asset limit from KRW 140 million to KRW 200 million (around USD 170 000); and increased income limits, for example from KRW 2.5 million to KRW 3.6 million (around USD 3100) for a dual-income family. In addition, the ceiling on EITC payments was raised, for example from KRW 2.5 million to KRW 3 million (around USD 2 600) for a dual-income family.

The EITC, when supported by a moderate minimum wage, is an efficient tool to increase low-paid workers' income, used in many OECD countries (OECD, 2018a). It prevents low-skilled workers from being priced out of the job market while preserving strong work incentives, albeit at a cost for the government budget. To some extent, the EITC can be an alternative to minimum wage hikes, although there is also some complementarity (Williams and Waxman, 2019). Hence, it is necessary to carefully monitor the effects of the minimum wage and EITC on the employment of vulnerable groups.

Active labour market policy should focus on reducing skills mismatches

Spending on active labour market policies as a share of GDP was less than two-thirds of the OECD average in 2017 (Figure 2.19, Panel A). Moreover, about half of that amount was spent on direct job creation (Panel B). Creating public sector jobs helps low-skilled workers and contributes to expanding the provision of needed public services. During the COVID-19 crisis, direct job creation will limit the contraction in total employment. In the case of older workers, it amounts to an imperfect solution to compensate for early mandatory retirement with insufficient pension coverage. However, policies focussing on re-skilling and up-skilling would be needed to respond to the need of labour reallocation induced by the COVID-19 crisis, address skill mismatches, create better quality jobs, thereby reducing labour market duality and fostering higher productivity growth. The Employment Success Package Programme (ESPP), a rapidly growing programme to raise the employability of disadvantaged groups, including low-skilled elderly

jobseekers and youth, could be strengthened further through promoting participation, increasing resources and enhancing the monitoring of performance (OECD, 2018b). Public employment service organisations, such as Job Centres and Job Hope Centres for middle-aged and elderly people provide a wide range of re-employment services tailored to individual needs, but second-career guidance should be stepped up, through comprehensive assessments of worker skills and experience, and additional training where necessary, with formal recognition and validation of acquired skills (OECD, 2018a). Strengthening the governance of adult learning to create a common, comprehensive and inclusive long-term vision, as well as enhance coordination across ministries and levels of government and with stakeholders, would support adult learning policies (OECD, 2020d,e).

Figure 2.19. Active labour market programmes focus most on direct job creation


A. Public spending on active labour market programmes

B. Composition of active labour market programmes
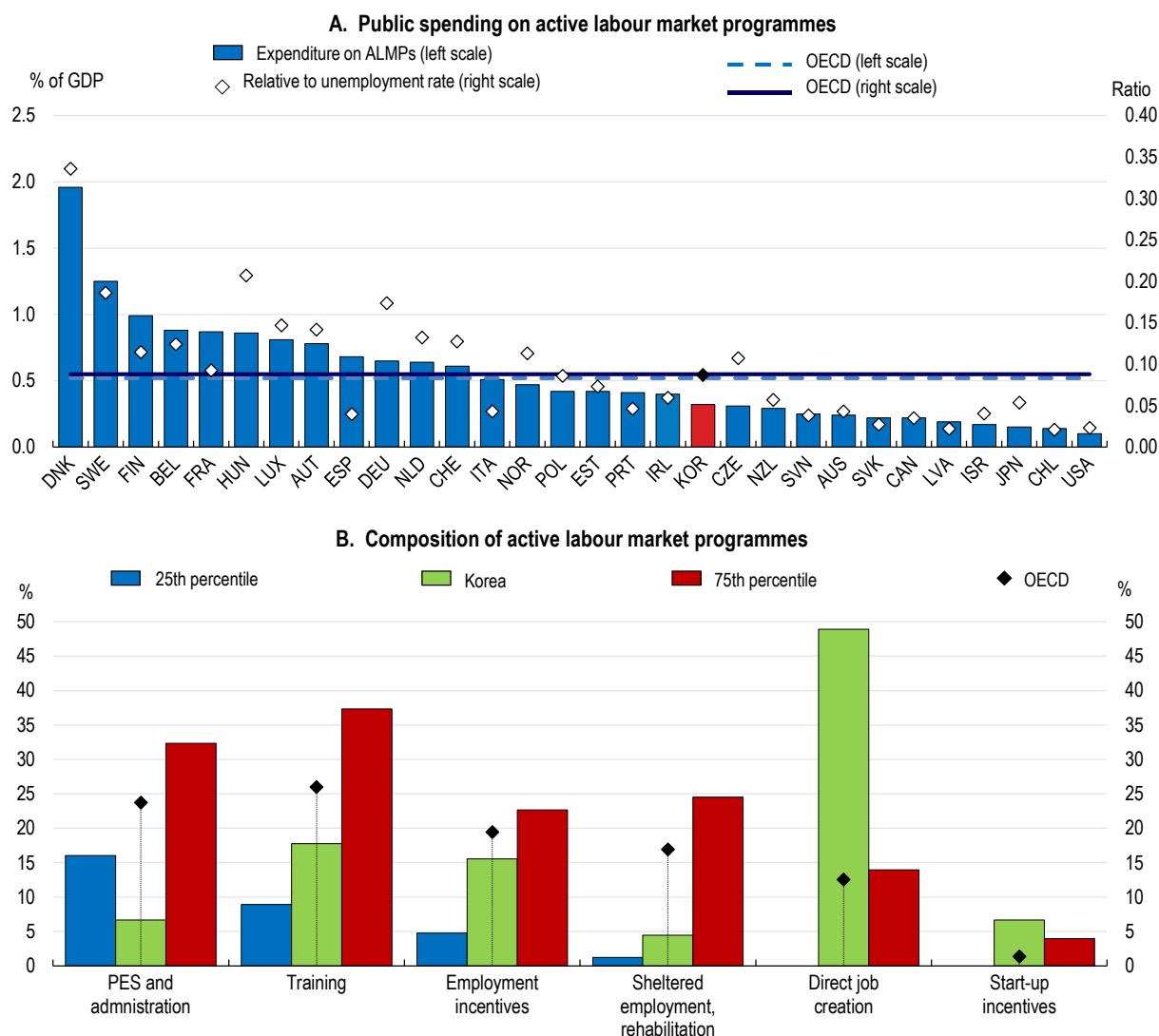
Source: *OECD, Database on Labour Market Policies.*

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Spending on Korea's public employment service (PES) as a share of GDP is among the lowest in the OECD (Figure 2.20), despite evidence that it is more effective, along with vocational education and training, than other active labour market programme in increasing employment rates in the medium to long term (Kim, 2015). Although low PES spending on active labour market policies partly reflects the low unemployment rate, resources are too scarce to allow sufficient job search support and counselling on training, which would be most useful to address labour market mismatches. Only one in four prime-age jobseekers reports having been in contact with the PES in the past month to find work, the lowest proportion in the 22 OECD countries for which information is available, and 30 percentage points below the cross-country average (OECD, 2018c). Even though Job Centre staff has increased over recent years and contracting out more employment services to external providers has alleviated the burden on the PES, additional public resources should be directed to the PES to secure successful employment transitions. A comprehensive approach should be used to support groups facing multiple barriers to employment (OECD, 2018a). As the risk of long-term unemployment varies greatly across individuals, statistical profiling could be used to target the most vulnerable and enhance the efficiency of active spending, as in Flanders (OECD, 2020g). Besides, increasing EI coverage, in addition to alleviating poverty, may help activation, as it provides a contact point through which the unemployed can be approached and assisted.

Figure 2.20. Employment service resources are among the lowest in the OECD

Expenditure on administering employment services and benefits administration, 2017
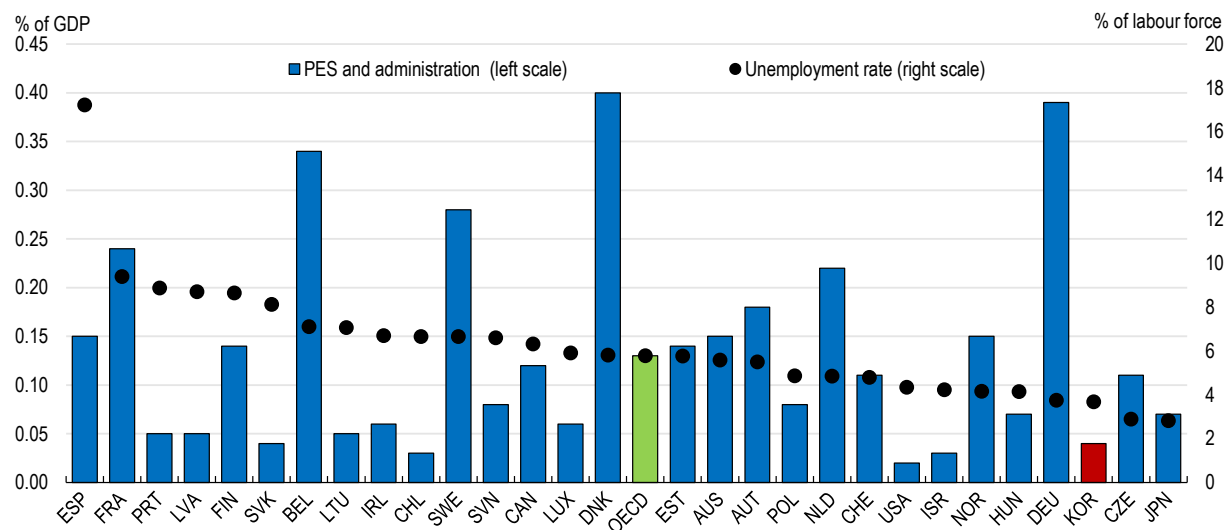
Note: For Korea, does not include the labour costs of public officials working in job centres.
Source: *OECD Labour market programmes database and OECD Economic Outlook database.*

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Recommendations to raise employment and enhance job quality and inclusiveness in the face of COVID-19 and rapid ageing

Key recommendations in bold

MAIN FINDINGS	RECOMMENDATIONS
Job quantity and quality post-COVID-19	
About half of spending on active labour market policy is for direct job creation. Public employment service resources are limited. Funding for training programmes has increased in response to the COVID-19 crisis.	**Adjust resources for the public employment service and training programmes to maintain effective support for jobseekers.**
Workers are often forced to retire from their career job in their fifties for various reasons, leading to a waste of human resources and worsening old-age poverty. The mandatory retirement age was increased to 60 in 2016-17.	**Expand incentives for workers and employers to ensure that workers stay longer in their career jobs, including through more flexibility in wages, with the view to raising the minimum mandatory retirement age further over time**
Korea has no statutory (or coherent privately-regulated) cash sickness benefit, causing hardship and complicating return to work. However, crisis measures were taken in the context of COVID-19. The New Deal includes a sickness benefit implementation study in 2021 and a pilot project for households, including low-income families, in 2022.	**Match the introduction of a cash sickness benefit planned in the New Deal with a strong focus on rehabilitation and return to work.**
Assessment of worker skills and experience, with additional training where necessary and formal recognition and validation of acquired skills, is insufficient.	Encourage participation in training and strengthen second-career guidance for mid-career and older workers.
Job mobility is allowed only in specific cases and sector mobility is impossible for foreign workers, which limits their opportunities and contribution to the Korean economy.	Gradually adapt the job mobility system for foreign workers.
The nearly 30% rise in the minimum wage over 2018-19 may have affected employment in sectors employing low-skilled workers.	Carefully monitor the effects of the minimum wage and EITC on the employment of vulnerable groups.
Labour market inclusiveness	
The take-up of parental leave is low, partly due to lack of coverage (particularly for self-employed and atypical workers) and weak financial incentives, especially for fathers. This hinders the rise in the female employment rate.	Encourage the take-up of parental leave by extending coverage to groups of workers hitherto not covered and introducing options to take parental leave for shorter periods at higher payment rates.
The old-age poverty rate is the highest in the OECD, partly due to the immature pension system, but also to low and restricted means-tested support, despite recent improvements.	**Further increase the Basic Pension and focus it on the elderly in absolute poverty.** **As planned under the New Deal, phase out the family support obligation from the Basic Livelihood Security Programme.**
The gender wage gap is the largest in the OECD.	**Regularly publish a national-level analysis of wage difference determinants to promote fairer wages across genders.**
Foreign workers under the Employment Permit System (EPS) are not eligible for income support, even though they may stay in Korea for up to 10 years.	Grant foreigners with permanent residence access to income support (BLSP and EITC).
Resilience and adaptability to withstand possible future shocks	
Social protection for non-regular workers and workers in small companies remains weak, exposing them more to the COVID-19 shock, and significant coverage gaps in Employment Insurance remain.	**Strengthen protection and coverage for non-regular workers and workers in new forms of employment (e.g. platform workers) and increase compliance with social insurance through more effective enforcement.**
Employment protection legislation for individual dismissals of permanent workers is relatively stringent, which may affect labour reallocation towards the most productive uses.	Once the COVID-19 crisis is overcome, taking into account labour market conditions, gradually ease employment protection legislation for permanent workers.
Coordination between the authorities responsible for adult education is insufficient to support effective adult learning policy implementation and ensure sufficient access to information for users.	Enhance coordination of adult education policies across ministries and levels of government and with stakeholders.

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# 3 Promoting the diffusion of technology to boost productivity and well-being

Korea is a top player in emerging digital technologies, with an outstanding digital infrastructure and a dynamic ICT sector. The COVID-19 outbreak highlighted the importance of digitalisation to contain the spread of the virus, by allowing quick testing and tracing of infected people, and spurred the development of the "untact economy". Remote access both facilitated physical distancing and mitigated the economic impact of the crisis by enabling more people to continue working. Digital technologies offer opportunities to raise firms' productivity and the population's well-being. However, wide productivity gaps between large firms and SMEs and between manufacturing and services weigh on economy-wide productivity, which is far below the OECD average. A wide skills gap between youth and older generations prevents an increasing share of the population from taking part in and enjoying the benefits from a digitalised economy. This chapter suggests ways to narrow the digital divide by enhancing the diffusion of digital technologies among firms and individuals. Increased participation in quality ICT education and training for students, teachers, SME workers and older people is key to address the lack of adequate skills and awareness of digital benefits or dangers (online security, cyberbullying, addiction). Promoting innovation networks between SMEs, academia and large firms through vouchers or platforms can support SMEs' R&D and commercialisation of innovative goods and services. Waiving stringent regulations through regulatory sandboxes can help identify and alter regulations that hinder the adoption and diffusion of digital technologies.

Rapid diffusion of technology is key to supporting output growth and raising well-being standards in the context of a rapidly ageing population and a weakening trend in global growth. The COVID-19 outbreak is also strengthening the existing trend towards digitalisation, with a growing use of artificial intelligence and remote services by firms and households (Box 3.1). While Korea has made tremendous economic progress over the past decades, its productivity remains below the OECD average. This largely reflects gaps between large firms and SMEs and between industry and services. Productivity gaps are mirrored by wage inequality, which is among the highest in the OECD, and more broadly by differences in working conditions and levels of social protection among different categories of workers (OECD, 2020a). Digitalisation offers huge opportunities to raise productivity economy-wide and to tackle inequality, but widespread diffusion requires adequate policies, notably to enhance skills, adapt regulations, create networks for technology diffusion and innovation, and ensure cybersecurity.

Korea is a frontrunner in digital technologies and one of the top five contributors to the development of emerging digital technologies. Over 2013-16, Korea accounted for 4 to 46% of global patenting in fast-growing information and communication technology (ICT) fields (Figure 3.1). The digital infrastructure is also outstanding. Access to high-speed internet is almost generalised and 5G was introduced nationwide earlier than in any other country in the world. Within one year of 5G services' commercial introduction on 3 April 2019, the number of subscribers had almost reached six million, with high fibre-backhaul availability enabling fast adoption (OECD, 2019a). Korea's density of broadband fibre subscriptions is the highest OECD-wide (Figure 3.4).

Figure 3.1. Korea is one of the top players in emerging digital technologies

Share of top five economies' patents in top 25 technologies fast accelerating from 2010 onwards, 2013-16
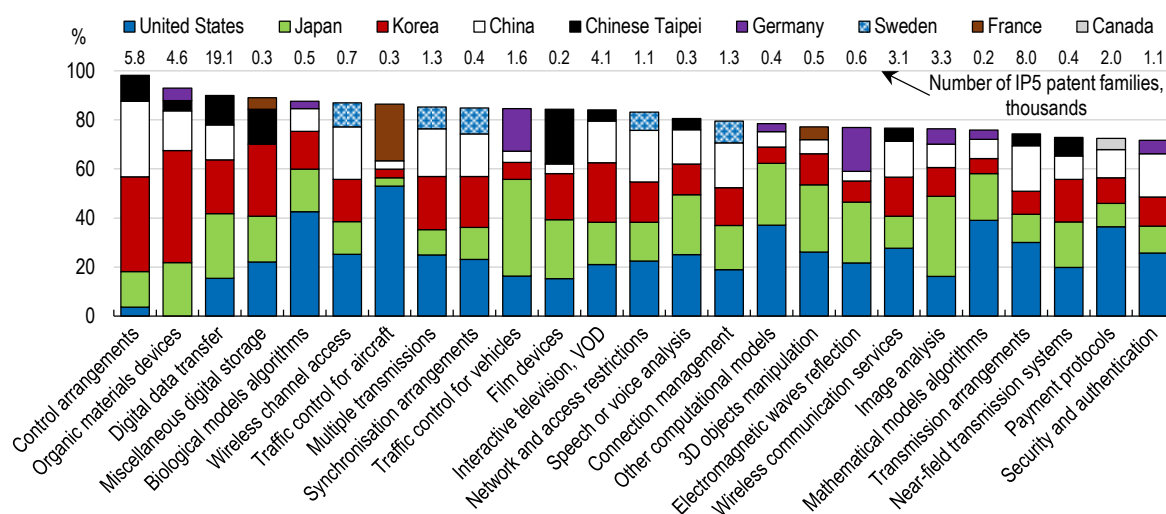
Note: IP5 denotes the five largest intellectual property offices worldwide (European Patent Office, Japan Patent Office, Korean Intellectual Property Office, National Intellectual Property Administration of People's Republic of China and United States Patent and Trademark Office). Fast-accelerating ICT 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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Box 3.1. Use of digitalisation to tackle COVID-19

Korea has been leveraging various digital tools to contain COVID-19 without shutting down the economy, by quickly testing and tracing infected people and facilitating a contact-free lifestyle.

Artificial intelligence and fast testing

Artificial intelligence (AI) contributes to significantly shorten research-to-market cycles and improve diagnosis efficiency. A famous example is the Seegene COVID-19 test kit: an AI-based big data system was used to develop this test within two weeks, instead of two to three months had it been done manually. VUNO developed AI techniques used by public health centres and hospitals to quickly identify patients requiring intensive care by reading lung X-rays within seconds.

Mobile apps and transparent information

Several mobile apps have been developed since the outbreak of COVID-19 to inform and advise the public in real time. Korea Spatial Information & Community developed a map service to direct people with COVID-19 symptoms to the nearest testing stations, using a geographic information system. Inbound travellers are required to install an app on their smartphone to submit a daily self-diagnosis for 14 days and check the location of screening clinics.

Naver, Kakao and other software developers use data provided by pharmacies to share information on the sales and inventories of publicly-supplied filtering respirators within their respective map apps. 22 000 out of Korea's 23 000 pharmacies have agreed to share their data. This helps reducing crowding at pharmacies and ensuring physical distancing.

Apps like Corona 100m or Corona Map plot locations visited by patients diagnosed with COVID-19 (Figure 3.2). In the case of Corona 100m, information such as age, gender and nationality, is also made available, which raises privacy concerns. Other privacy concerns involve the potential use of wristbands connected to a mobile app and alerting the authorities in case of self-quarantine violations.

Figure 3.2. Corona Map App plots locations with confirmed cases of COVID-19
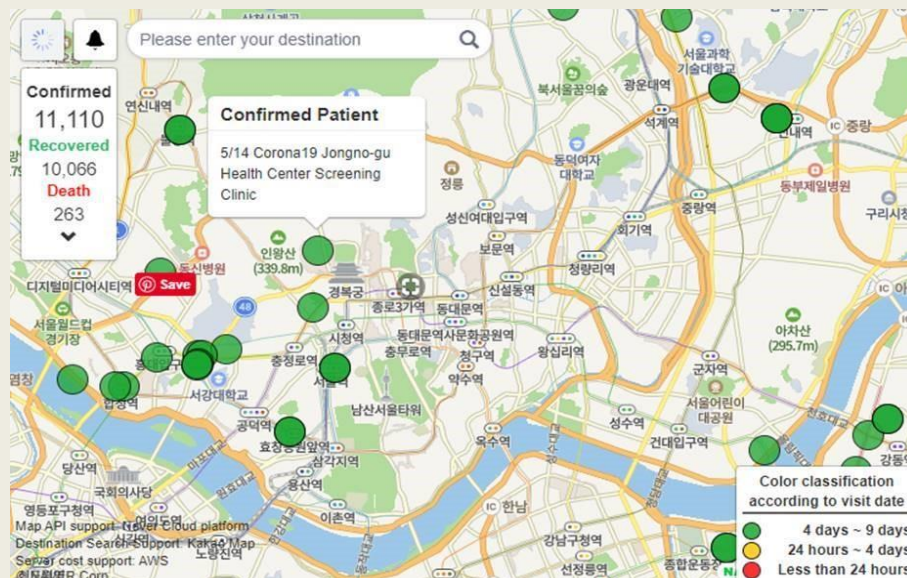

Source: https://coronamap.site

Remote services and untact lifestyle

The COVID-19 outbreak has led to the emergence of a new lifestyle with less physical contact to limit the spread of the virus. Many firms have allowed their employees to work from home, while schools have started online classes in April. In both cases, a continuous internet connection and reinforced cybersecurity are key to ensure the proper functioning of remote work and videoconferences. For students, it also implies the need to have easy access to a digital device and, for the younger ones, adult assistance, to complete studies at home. For teachers who are still inexperienced in holding classes online and often lack digital skills, it requires specific training.

Households have increasingly turned to e-commerce for their daily purchases. In March 2020, year-on-year online purchases of food and beverages and household goods were up respectively by 59% and 47%, after a year-on-year surges of 71% and 53% in February (Figure 3.3). AI robots are allowed to deliver food and parcels in the Magok and Gangseo districts of Seoul, thanks to a regulatory sandbox.

Figure 3.3. Households turned to e-commerce during the COVID-19 outbreak

Year-on-year changes, %

A. Food & beverages

B. Household goods

Source: KOSIS.

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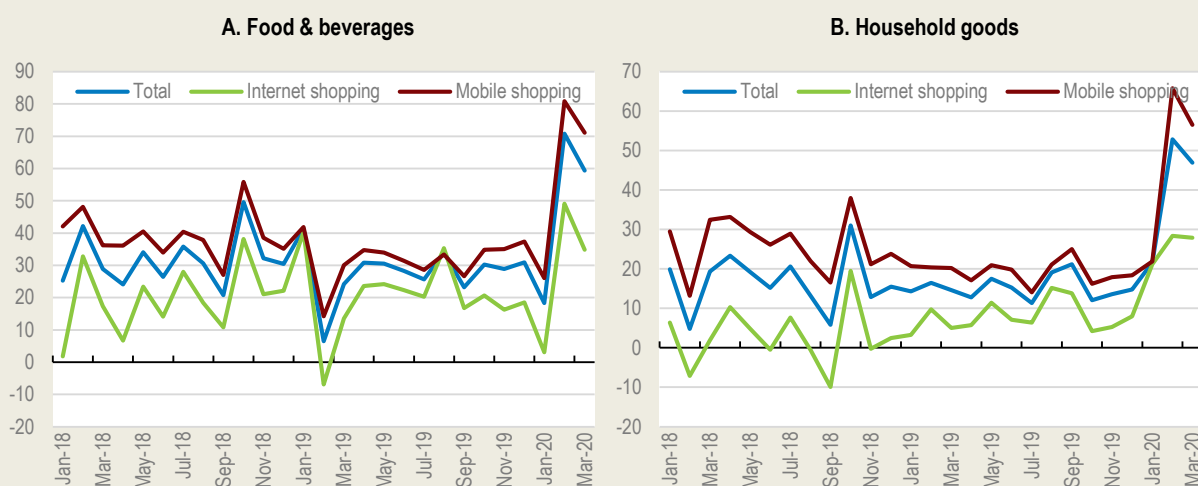
Healthcare services also went through important changes, especially in the case of telemedicine. Since the end of February, doctors are allowed to treat patients with mild symptoms on the phone. Other ways of being informed on COVID-19 while avoiding physical contact involve AI robots. Wisenut developed a public chatting robot that informs people on ways to prevent and respond to COVID-19, while Naver developed an AI-based voice robot that automatically calls people needing attention, inquires about their health condition and then informs the public health centre.

Source: ITU (2020); Tonby et al. (2020).

Figure 3.4. High-speed broadband is widespread in Korea

Percentage of fibre connections in total fixed broadband
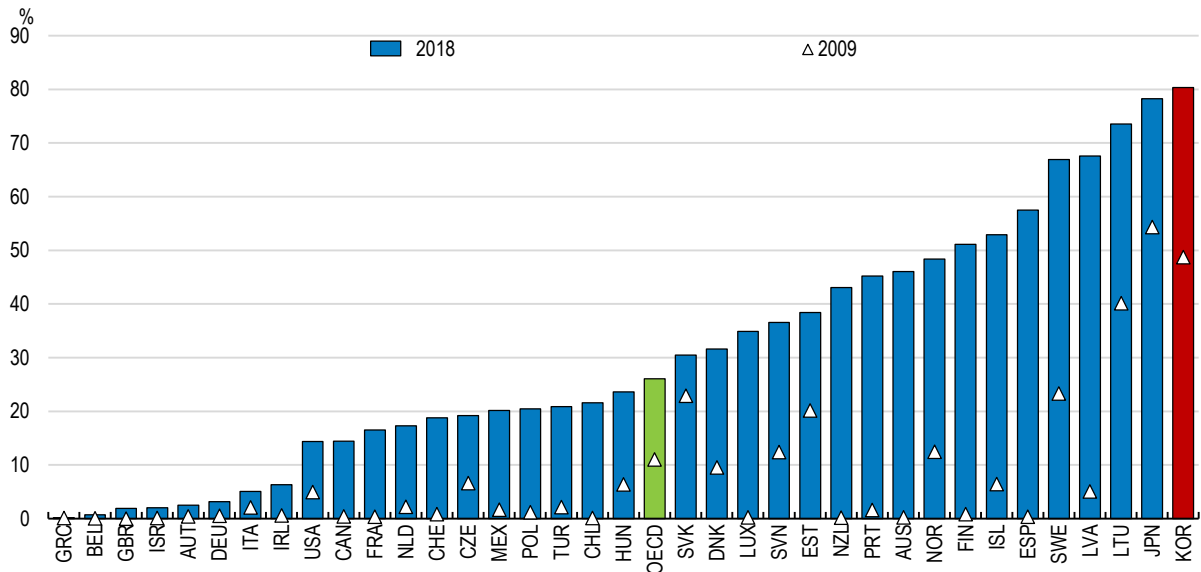
Note: 2010 for Canada, Turkey and United Kingdom instead of 2009.
Source: OECD Broadband Database.

The government's plan for innovative growth focusses on digital opportunities raised by the use of 5G, which brings three key advantages. First, its higher speed allows the transmission of large volumes of data, for instance for virtual reality TV or hologramme calls. Second, its lower latency allows instant response, for example for automatic and connected vehicles or Internet of Things (IoT) devices. Third, its hyper-connectivity allows the simultaneous connection of numerous sensors and devices, as needed in smart factories and smart cities. The government promotes numerous projects relying on 5G to increase competitiveness and innovation in industries (for example smart manufacturing, smart grids and smart healthcare) or enhance the quality of life by solving social problems with smart cities and homes (notably in Sejong), as well as smart roads and traffic systems. The expected effects include higher production, exports and employment (Fourth Industrial Revolution Committee, 2017). Amid the COVID-19 outbreak, Korea contained the spread of the virus, using advanced digital tools based on artificial intelligence and mobile apps, as well as remote access to daily life services (telework, online classes, e-commerce, telemedicine…).

Korea's dynamism in digital technologies is reflected in its high share of value added and employment in ICT sectors (Figure 3.5). Even so, economy-wide productivity is far below the OECD average (Figure 3.6). This reflects several structural features. Low-productivity sectors like trade, transportation, accommodation and catering account for a higher share of total employment than the OECD average (28% against 25%). Moreover, most jobs created in new Korean small and medium sized enterprises (SMEs) are in low productivity activities, like in many OECD countries (OECD, 2019c): in 2017, 56% of jobs created by the birth of new SMEs were in trade, transportation, accommodation and food services. Furthermore, in high-productivity sectors like manufacturing, SMEs account for a high share of enterprises and of employment, but are less productive than large firms (*2018 OECD Economic Survey of Korea*). This productivity gap is observed across OECD countries but is substantially larger in Korea (OECD, 2020a).

Firms can raise their productivity by adopting digital technologies or benefit from spillover effects from firms adopting digital technologies within the same industry (Gal et al., 2019). Korea's ICT manufacturing

productivity is far higher than in other industries, with a much wider gap than in the average OECD country (Figure 3.5). Non-ICT manufacturing also enjoys a larger relative productivity advantage than the OECD average, albeit much smaller than in ICT. Conversely, there is scope to increase productivity in services, especially in ICT services, which are knowledge-intensive and tend to be more productive than other services (Sorbe et al., 2018).

Figure 3.5. Low-productivity sectors account for a high share of total employment
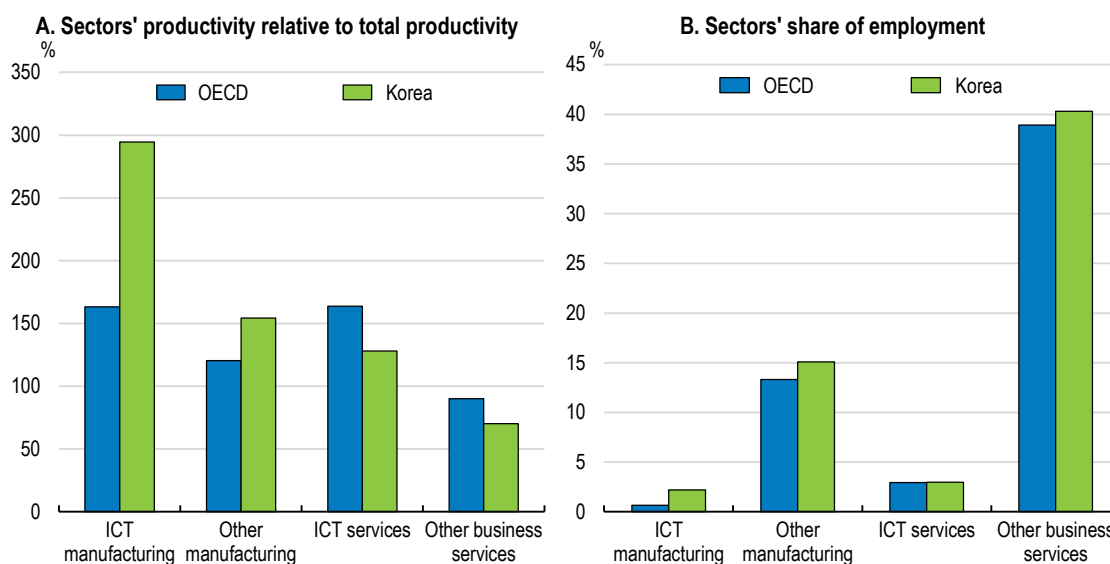
Note: Data refer to 2015. 'ICT manufacturing' includes manufacture of computer, electronic and optical products. 'ICT services' include publishing, telecommunication and IT services. 'Other business services' excludes the housing sector.
Source: OECD STAN Database.

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Figure 3.6. Economy-wide productivity in Korea is far below the OECD average

USD (current PPPs) per hour, 2018
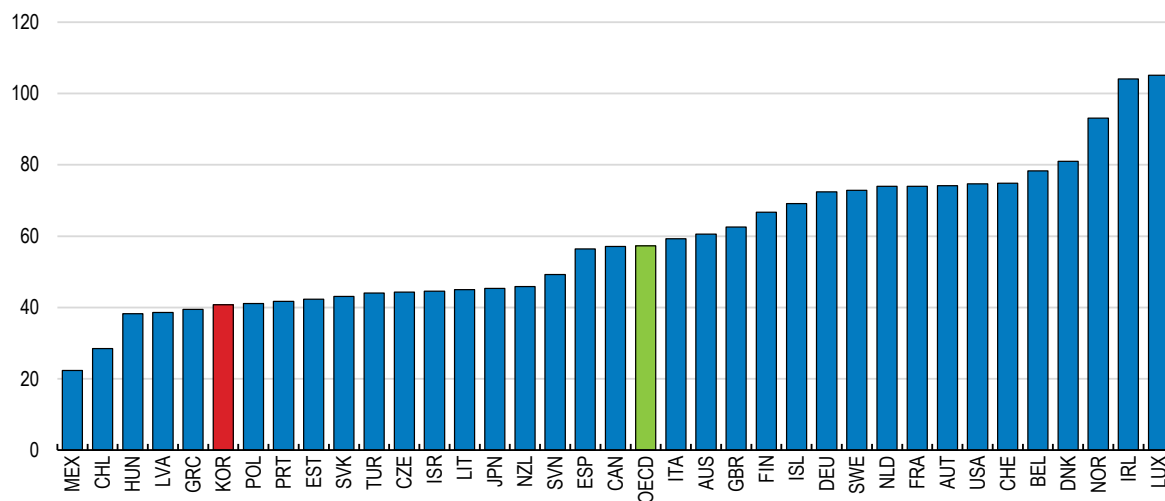
Source: OECD Productivity Database.

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Digital opportunities to raise productivity are not used to their full potential

Smartification of factories can raise SME productivity in manufacturing

Smart factories use information and intelligence technology (cloud computing, big data, artificial intelligence, IoT) to move the production process from traditional automation to a fully connected, flexible and optimised system, and design customised products at mass-production prices (Kim et al., 2019). Smart factories present several advantages in terms of production performance and employment. In enterprises that have adopted smart technology and actively used and shared data generated by technology, productivity and product variety have improved, while defect rates have fallen (Kim et al., 2019). Smartification of factories can contribute to job creation in the country by allowing factory reshoring (Fourth Industrial Revolution Committee, 2019). The composition of workers in smart factories can also change as the use of advanced technologies attracts young workers and lowers the intensity in physical labour, facilitating the employment of women and older workers. There is already evidence of a slight increase in youth employment in some enterprises, after they adopted smart technologies, but not yet in the employment of women and older workers (Nho, 2019).

Smart factories are central to the government's plan for the Fourth Industrial Revolution. At the end of 2019, Korea had 12 660 smart factories. To promote the development of SME smart factories, the government has introduced pilot smart factories as benchmark for other SMEs, inspired by experiences in countries like Germany and in relevant industries. Factories operating successfully can be designated as pilot factories and get financial support for half of their expenses spent to purchase smart devices and develop partnership programmes. In early 2020, 51 SMEs in car parts, paper, electronic parts, aircraft and machinery industries became pilot smart factories. Other strategies to expand and upgrade smart factories include financial support from the government and large business partners, the construction of a cloud-based smart factory for SMEs with insufficient data storage and management skills, and development of training and diplomas in smart factory-based technology (Fourth Industrial Revolution Committee, 2018). The goal is over 30 000 smart factories by 2022.

Table 3.1. The five levels of smart manufacturing

Development stage	Level	Goal	Main ICT tools
Basic	Level 1 – Identify	Construct the information system to identify materials	Barcodes and RFID
Basic	Level 2 – Monitor	Gather and monitor in real time data from the workforce, machines, equipment and materials	Sensors
Intermediate I	Level 3 – Analyse	Control, measure and analyse data collected in level 2	Sensors and analysing tools
Intermediate II	Level 4 – Optimise	Gather, analyse and simulate data to optimise the production process (workforce, machines, equipment, materials, operating conditions)	Sensor controller optimisers
Advanced	Level 5 – Customise	Customise the production process by optimising the workforce, machines, equipment, operation and environment conditions	Artificial Intelligence, Augmented Reality/Virtual Reality, Cyber-Physical System

Source: https://www.smart-factory.kr/smartFactoryIntro.

The development of smart factories goes through five levels (Table 3.1). In Korea, the level of development in smart factories is still low. In 2018, most of them were at the basic or intermediate I level (80.0% and 18.6% respectively), only 1.4% were at the intermediate II level and none of the SMEs had reached the advanced level. The main reasons behind this slow development include a lack of workers with the relevant skills and of an efficient retraining system, as well as underdeveloped innovation networks promoting collaboration between innovative companies, especially between SMEs and large enterprises (Fourth Industrial Revolution Committee, 2019). A sample of SMEs that adopted smart technologies were surveyed by the Korean Agency of Information on Technology. Their main problems included the maintenance or

instability of the new production system, its incompatibility with former systems, skill shortages and training difficulties. The lack of awareness from managers was also underlined by these SMEs. This contributes to the low level of development in Korean smart manufacturing, since good management practice and interest of CEOs in upgrading their manufacturing system are important drivers of factory smartification. For instance, factories in the bottom 20% of the distribution of incentives in management practices have not experienced any increase in the level of smartification (Kim et al., 2019). The Ministry of SMEs and Startups (MSS) put forward a wide range of measures to further support and enhance the development of smart SME factories in its 2020 budget (Box 3.2).

Box 3.2. Government measures to support smartification projects in 2020

The Ministry of SMEs and Startups (MSS) 2020 budget plan amounts to KRW 13.5 trillion (about USD 11.5 billion), up from KRW 10.3 trillion for 2019 and mainly includes measures to promote manufacturing innovation in SMEs and support their scaling-up.

Measures to support manufacturing innovation and technology development

- Establish the "Manufacturing Data Centre" to analyse and process data generated from smart factories (KRW 6.7 billion).
- Further increase the penetration rate of smart factories in manufacturing (KRW 415 billion).
- Extend the coverage of smart factories from manufacturing to services, with the smart service project (KRW 9.3 billion) and the smart store project (KRW 1.7 billion).
- Further support R&D for technological innovation and commercialisation for SMEs, and for stronger collaboration between SMEs and large enterprises, and between industries, universities and institutes (KRW 1.5 trillion).

Measures to support the scale-up of start-ups and venture companies

- Support 300 start-ups in the fields of semiconductors, bio-health and future cars (KRW 45 billion); set up a mentoring project between retired experts and start-ups (KRW 6 billion).
- Increase the budget for the Tech Incubator Programme for Start-ups (TIPS, KRW 54.4 billion).
- Double the budget for the in-company venture programme (to KRW 20 billion).
- Help promising start-ups become unicorns (KRW 12 billion).

Other measures

- Provide R&D and other funds for seven regulation-free special zones to support regional industries in future cars and bio-health (KRW 61.5 billion).
- Provide vouchers to manufacturing SMEs for technical assistance and consulting services (KRW 59.4 billion).
- Further encourage youth to work in SMEs through the Naeil Cheum Mutual Aid Programme for Youth Employees (KRW 339.9 billion).
- Create a Korea Start-up Centre in Finland and Sweden to help start-ups establish networks there and carry forward the Youth Personnel Global Marketing project (KRW 2 billion).
- Expand the project for Export Vouchers to help SMEs enter the international market (KRW 99.8 billion).

Source: Ministry of SMEs and Startups, Press Release, 29 August 2019.

Digitalisation can increase productivity through servicification of manufacturing

With the development of ICT technologies, services are increasingly embedded in manufactured products, a phenomenon known as "servicification" of the manufacturing industry. Manufacturing firms increasingly rely on services, either as inputs, as production activities within the firm, or as output sold bundled with goods (Miroudot and Cadestin, 2017). For instance, manufacturing uses services, such as R&D, design, transport, logistics, finance, distribution and marketing as inputs. These input services can be produced in-house or outsourced. Manufacturers of cell phones can bundle their product with telecommunication services to allow users to install apps, which will generate additional service transactions, such as audiovisual services with video streaming and music, publishing services with e-books, or computer services with video games. Smart manufacturing, as well as IoT and 3D printing, contribute to the increasing servicification of manufacturing. ICT services, such as computer programming, software publishing, telecommunication, data processing and advanced data analytics, are the main producers and users of data, which are central to smart manufacturing. For instance, data processing services like cloud computing generate data for smart factories, while advanced data analytics services optimise the production process based on this real-time information (Hallward-Driemeier and Nayyar, 2018).

Servicification of manufacturing helps firms create value and increase their productivity and exports. Manufacturing firms use three types of services to create value: input, in-house production, and output (Miroudot and Cadestin, 2017). In the case of service inputs, manufacturing firms may improve their productivity or reduce their costs, by using legal, management, engineering or banking services. In the case of in-house production, more R&D increases the innovative capacity of the firm and its competitiveness, while more IT services improve the production process and productivity. For example, there is evidence of higher exports for Swedish manufacturing firms that have a larger share of manager, professional or technical services – more likely to be in knowledge-intensive services – in their in-house production (Lodefalk, 2014). In the case of sales of services bundled with manufacturing goods, after-sales services or installation and maintenance services become new sources of income for firms.

Korea is lagging behind the most advanced OECD countries in the development of manufacturing servicification, in terms of service inputs, production and exports. First, the share of service inputs in Korean manufacturing exports is one of the lowest among OECD countries (25%), with half of these inputs outsourced to foreign firms (Figure 3.7). Like in other OECD countries, Korean manufacturing industries mainly use distribution services as domestic and foreign services inputs (12% of manufacturing exports), as well as professional and administrative services (5%), while ICT services are barely used as inputs (1%). Second, the share of in-house services produced by Korean manufacturing firms to export their goods is one of the lowest among OECD countries (less than 10% of gross exports), along with Eastern European countries, while the United States and Germany have over 20% of in-house services in their exports (Miroudot and Cadestin, 2017). Third, Korea has the lowest share of firms selling both manufacturing goods and services (3.5%), after Mexico, Chile and Iceland, based on the ORBIS database (Miroudot and Cadestin, 2017). The share of firms exporting both manufactured goods and services is even lower (0.5%).

Figure 3.7. The contribution of domestic services to Korean manufacturing exports is low

Value added share of manufacturing gross exports by industry inputs, 2015
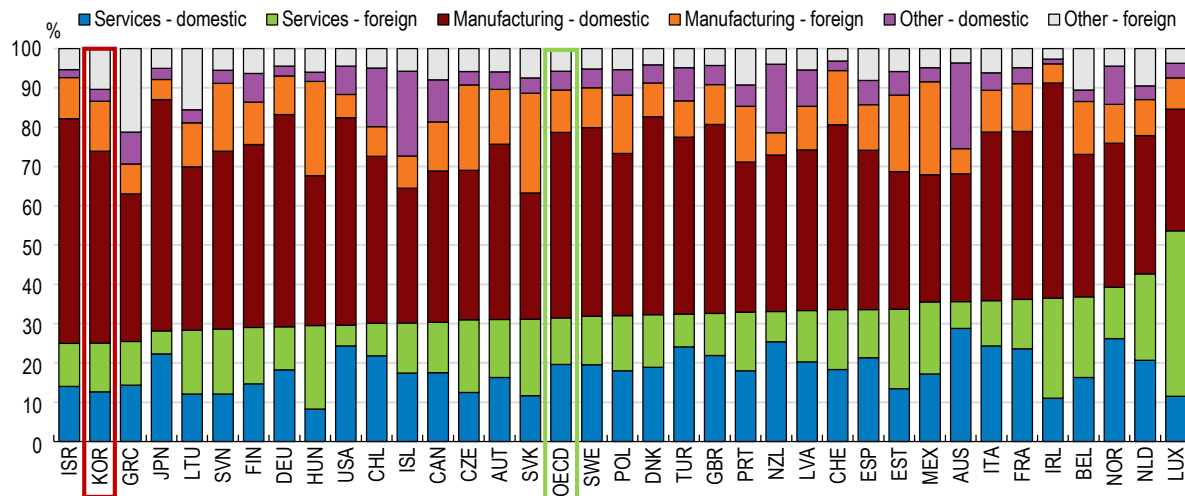
Note: 'Other' includes primary, utilities and construction industries.
Source: OECD TiVA Database.

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Digital technologies can increase productivity in services

In Korea, productivity in ICT services and other business services are respectively equal to 74% and 41% of that of manufacturing. Productivity is even lower in trade, transportation and accommodation (31% of manufacturing productivity). Traditional services have intrinsic characteristics that reduce the scope for productivity gains. Compared to goods, they tend to be less standardised and require more face-to-face interactions in their delivery. This reduces productivity in services through three channels. First, the additional transaction costs reduce competitive pressures, efficient reallocation mechanisms and hence incentives to improve productivity. Second, the gains from economies of scale and automation are smaller. Third, services are less tradable within and across countries, which limits productivity gains from trade through knowledge spillovers, better specialisation and heightened competitive pressure (Sorbe et al., 2018).

Digital technologies offer new ways of producing and consuming services. For instance, artificial intelligence and advanced robotics can automate cognitive tasks typically carried out in service activities. Digital platforms can enhance competition among service providers and increase productivity in services, by reducing information asymmetries between consumers and service providers, thanks to ratings and reviews, or by substituting existing services, like Kakao T and TADA for taxis or Baemin for delivery services. Digital platforms also provide a wide range of services for consumers, like market services that can replace home production, such as housework with gig economy platform Daelijubu, or innovative FinTech services, such as peer-to-peer money transfer services proposed by Viva Republica's mobile app "Toss". However, the rapid emergence of digital platforms is facilitated by strong network externalities and the intensive use of data as input to their matching algorithms, which favour the emergence of dominant platforms and hinders competition. In Korea, Kakao T emerges as a dominant platform in transportation, with 24 million users registered, representing over 84% of the economically active population as of September 2019 (Kakao, 2019). The exact definition of gig economy workers is under discussion among tripartite partners. The National Learning Card introduced in 2020 will support the participation of gig

workers in vocational training. Other measures under discussion include the extension of industrial accident compensation insurance and unemployment insurance to platform workers.

Digital technologies improve the tradability of services and provide alternative ways of trading. For instance, blockchain provides new financial services that are fully digitally tradable and require no direct physical interactions. However, in the case of Korea, exports of digitally deliverable services are well below the OECD average, even though barriers to digital service trade are among the lowest in OECD (OECD, 2019d; Figure 3.8). SMEs can also benefit from digital technologies to gain access to international markets and take advantage of enhanced linkages to enhance their productivity (*2018 OECD Economic Survey of Korea*). E-commerce can help SMEs expand their business within and across countries, by significantly reducing upfront fixed costs, such as logistics or customer services (OECD, 2019e). In low-productivity sectors like accommodation and trade, where SMEs are more numerous, the share of Korean firms using websites for online ordering or reservation has significantly increased and has room to rise further (Figure 3.9).

Figure 3.8. Korean exports of predominantly digitally deliverable services are weak

As a percentage of total services exports, 2017
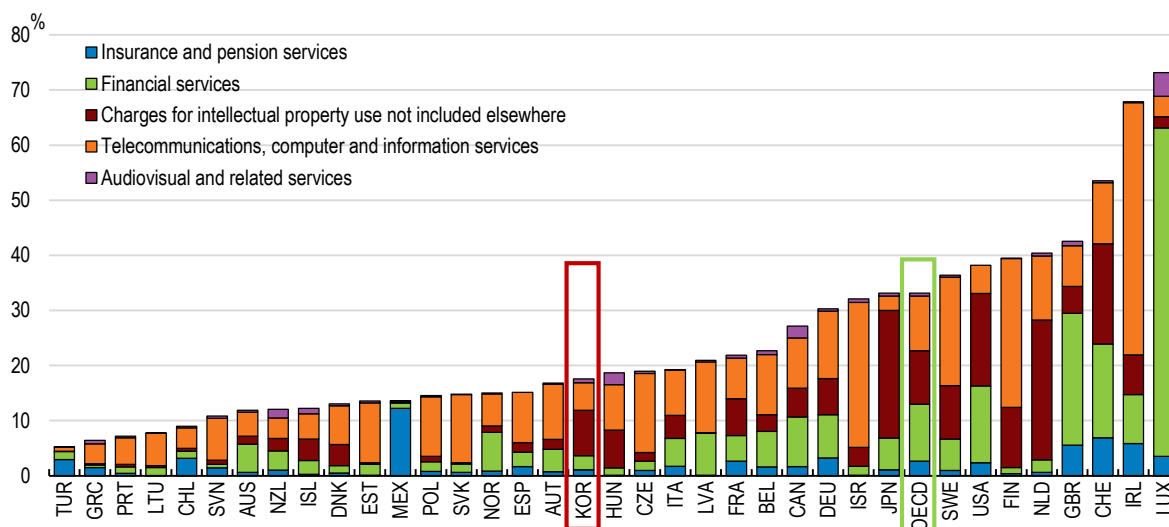
Source: OECD (2019b), calculations based on EBOPS 2010, https://www.oecd.org/sdd/its/EBOPS-2010.pdf; WTO, Trade in Commercial Services, October 2018.

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Figure 3.9. Use of websites for online ordering or reservation has increased rapidly in Korea

As a percentage of enterprises with ten or more employees; Accommodation and trade sectors
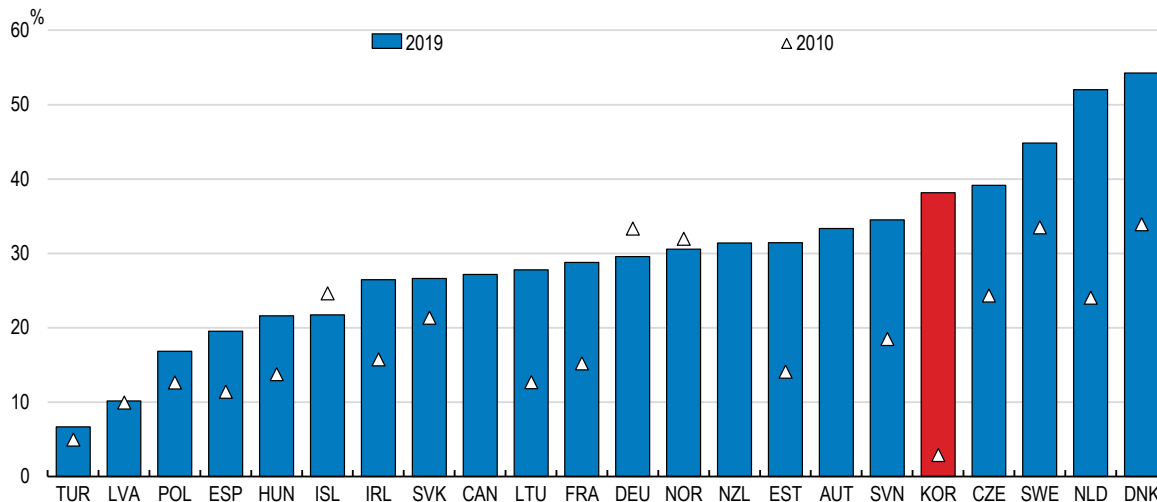
Note: Simple average of the share of enterprises in the accommodation, wholesale and retail sectors. 2018 for Germany, Iceland, Korea and New Zealand and 2017 for Canada instead of 2019; 2011 for France, Latvia, Poland and Sweden and 2013 for Korea instead of 2010. The statistical unit for Korea is the establishment and not the enterprise and covers public and private sectors.
Source: OECD ICT Access and Usage by Businesses Database.

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## The diffusion of digital technologies among firms and workers is slow

The development of smart factories, servicification of manufacturing or digital platform requires sophisticated digital technologies, such as cloud computing, big data, IoT and artificial intelligence. Korea actively contributes to the development of emerging digital technologies and benefits from a nationwide coverage of 5G. However, Korea still lags behind most advanced OECD countries in the adoption of these sophisticated digital technologies, especially in SMEs. This hinders the development of smart manufacturing. The lack of digital skills in SMEs and among older workers is also a barrier to the diffusion of digital technology.

Korea has margins for improvement in the adoption of sophisticated digital technologies

Over the past two decades or so, Korea remained at the cutting edge of ICT technologies, thanks to outstanding achievements in mobile devices, chips and appliances. In recent years, Korean firms have strived to reinforce their global competitiveness in new digital technologies, such as artificial intelligence, cloud computing, big data, 3D printing and IoT. However, IITP (2019) estimates Korea has a two-year lag in 3D printing, artificial intelligence, big data and cloud computing, and a one-year lag in IoT compared to the United States, which is considered the frontrunner in these technologies. Only 23% of Korean companies use cloud computing, against over 50% in the Nordic countries (Figure 3.10).

Figure 3.10. Korea is below the OECD average in sophisticated digital technologies adoption

As a percentage of enterprises with ten or more employees, 2019 or latest available year
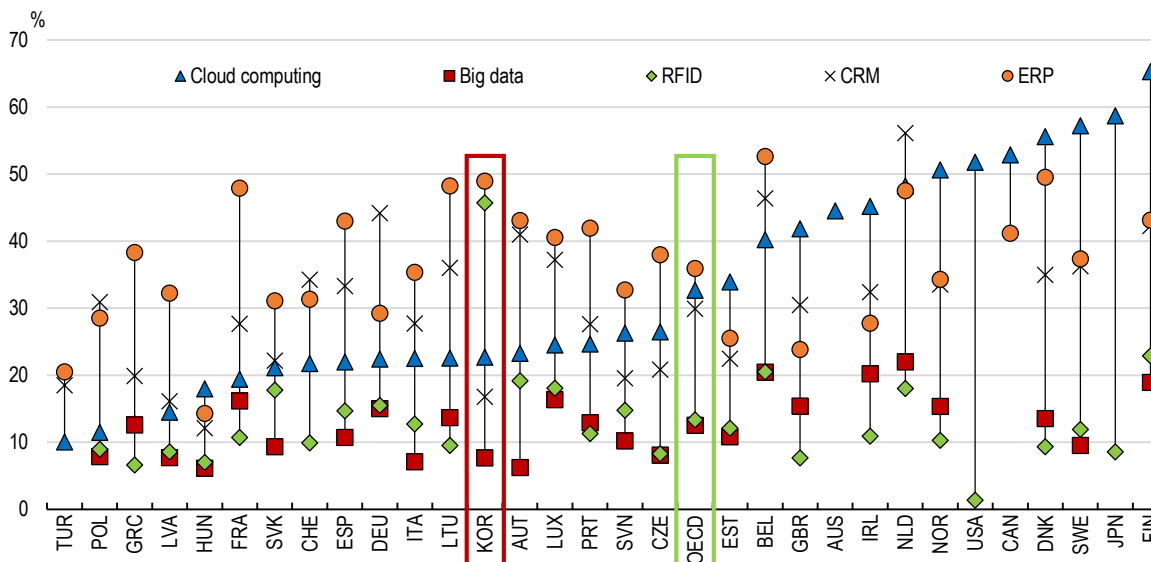
Note: RFID stands for Radio frequency identification; CRM for Customer relationship management; ERP for Enterprise resource planning. Data for cloud computing refer to 2018, except for Canada, Switzerland and United States (2017) and Australia (2016). Data for big data refer to 2018, except for United Kingdom (2016). Data for RFID refer to 2017 except for Japan and Korea (2018). Data for CRM refer to 2018 for Korea and to 2017 for Iceland and Switzerland. Data for ERP refer to 2018 for Korea and to 2017 for Canada and Switzerland. The statistical unit for Korea is the establishment and not the enterprise and covers public and private sectors.
Source: OECD ICT Access and Usage by Businesses Database.

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However, the Korean government and private firms are taking measures to catch up, especially in the adoption of cloud computing and artificial intelligence. Major business groups like Samsung and LG already committed to ambitious plans to expand their cloud-based systems. Samsung is expected to establish a cloud-based business management system by 2020, while LG is expected to switch 90% of its subsidiaries' IT infrastructure to a cloud-based system by 2023. Cloud computing services are key to lowering barriers to the adoption of the latest technologies (OECD, 2019c). They provide both individuals and businesses with on-demand access to ICT over a network at any given time. For SMEs and young firms, cloud-computing services are an important asset for digital transition, reducing the cost of experimenting with new technologies and increasing flexibility, as data processing and storage are managed in a remote data centre. During the COVID-19 outbreak, Korea stood out among OECD countries with its use of artificial intelligence to significantly speed up and improve diagnosis efficiency, especially with its test kits (Box 3.1).

The digital divide between SMEs and large enterprises is wide

Digital technologies are increasingly powerful and affordable for SMEs, but are not used to their full potential. The gap between SMEs and large firms in the adoption of sophisticated digital technologies is wide and higher than the OECD average (Figure 3.11). This gap reflects several obstacles to the adoption of digital technologies faced by SMEs. First, Korean SMEs are concentrated in services like trade, transportation, accommodation and food services, which are less knowledge intensive (Sorbe et al., 2018) and hence less prone to innovation than manufacturing: 56.7% of service firms are not innovating (against 47.9% in manufacturing) and they are less likely than manufacturing firms to engage in innovation to pursue cost reductions (Kang and Lee, 2019).

Figure 3.11. Digital gaps between large and small firms remain high

Percentage of enterprises with ten or more employees using selected digital tools, 2018 or latest year
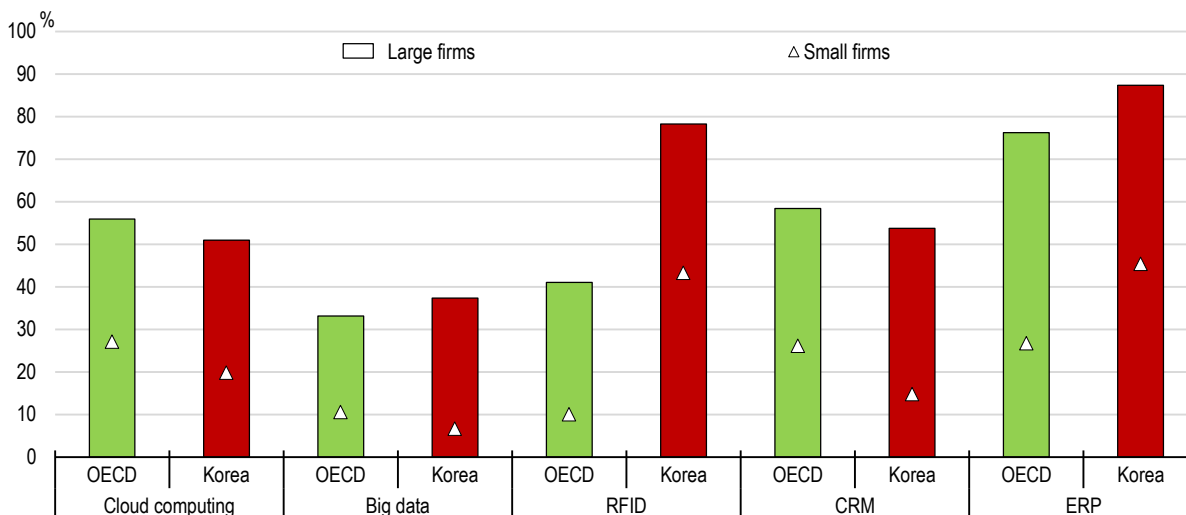
Note: RFID stands for radio frequency identification; CRM for customer relationship management; ERP for enterprise resource planning. The statistical unit for Korea is the establishment and not the enterprise and covers public and private sectors.
Source: OECD (2019b); OECD ICT Access and Usage by Businesses Database.

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Second, SMEs tend to lack information and funds. They are often not aware of the potential new digital tools could offer to increase their productivity or lower their production costs. They also consider the costs of adopting more sophisticated digital tools to upgrade their business model as too high (OECD, 2019c). According to the Survey on the Informatisation Level in Small and Medium Business conducted by the Korean Agency of Information on Technology, these are the main difficulties SMEs faced while participating in the smart manufacturing programme. In 2017, 57.4% of the 356 companies surveyed mentioned the lack of information on smart factories and 50.8% the issue of raising initial investment. The lack of information causes a lack of trust, which is the main obstacle to the adoption of cloud computing by SMEs (OECD, 2019c).

Third, SMEs face a lack of skilled workers and low access to training. For one third of SMEs in the 42 countries covered by the OECD/Facebook/World Bank Future Business Survey, hiring and keeping skilled employees is the most pressing challenge (OECD, 2019c). Compared to other OECD countries, Korean SMEs have more difficulties to hire high-skilled university graduates than larger firms because they offer less attractive jobs in terms of wages, stability, working hours and career advancement opportunities (OECD, 2020b). Across OECD countries, smaller firms lack soft skills for innovation, such as managing and communication skills, readiness to learn and creative problem-solving skills (Grundke et al., 2017). In Korean micro-firms, 34% of workers have low problem-solving skills in technology-rich environments (against 28% for the OECD average), while this share is much lower in large firms (19%), according to the OECD Survey of Adult Skills (PIAAC). In addition, training participation in Korean SMEs is one of the lowest among OECD countries, especially in micro-firms. The duration of training is also shorter in SMEs than in large firms: the median hours spent on (non-formal) job-related training is 32 hours per year for SME workers, compared to 48 hours in larger firms, according to PIAAC data. For SME workers, the main barrier to training is the lack of time because of work (52% of workers, against 32% for the OECD average). For firms, the lack of manpower is the most frequently cited reasons for not implementing or supporting training (30% of SMEs), along with fear of poaching (OECD, 2020b).

The digital divide between generations exacerbates social inequality

Adequate digital skills are key to thrive in an increasingly computerised society and economy. A digital divide is opening up between those who can get the most out of the Internet and online activities and the others. This in turn exacerbates well-being inequalities. Koreans have access to high-speed Internet, which allows them to undertake diversified and sophisticated online activities, such as online purchasing, Internet banking, online learning or uploading self-created content on sharing websites such as Youtube. The types and sophistication of activities undertaken on the Internet depend on several factors, like age, educational attainment, familiarity with online services, trust and skills (OECD 2019b).

In Korea, the types of activities carried out by Internet users vary widely across age groups. In 2019, 92% of Koreans aged 16-74 used Internet daily, the highest share among OECD countries, after Iceland, Denmark and Norway (OECD ICT Access and Usage by Individuals Database). While this share varies across age groups, with nearly all Koreans aged 16-24 being daily Internet users, it is also one of the highest for Koreans aged 55-74 (78%). The difference between youth and older people relates to the sophistication of their online activities. Individuals aged 55-74 limit their use of the Internet to basic activities, such as reading newspapers and news magazines online, and do not make the most of the wide range of online activities available. For instance, e-commerce gives access to a wider choice of products and can offer a more convenient shopping experience for persons with low mobility. Across OECD countries, young individuals engage more in online purchasing, but the age gap between e-consumers is usually small. In Korea, the age gap is the highest among OECD countries: 88% of individuals aged 16-24 versus only 24% of those aged 55-74 participate in e-commerce (Figure 3.12).

Figure 3.12. The age gap in online purchasing is the highest among OECD countries

Share of individuals participating in e-commerce, 2019 or latest available year
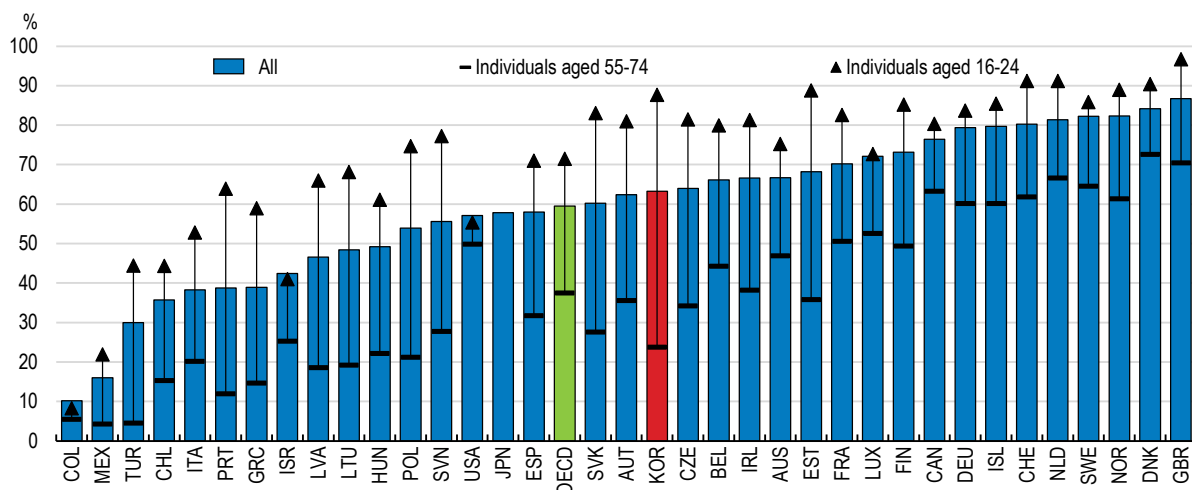
Note: Data refer to 2018 for Canada, Columbia, Japan and Mexico, 2017 for Chile, Israel and United States, 2016 for Australia.
Source: OECD ICT Access and Usage by Individuals Database.

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This digital divide in the diversity and sophistication of online activities reflects gaps in digital skills (problem-solving skills in technology-rich environments), as well as in basic skills (literacy and numeracy). An analysis on a sample of European countries directly connects digital and basic skills to the profile of Internet users. Lacking basic cognitive skills is a barrier to performing any online activities, while lacking digital skills is a barrier to performing diversified and complex online activities like e-finance, learning and

creativity (OECD, 2019f). Korea has the largest gap in digital skills between youth and older people (Figure 3.13). The share of 16 to 24 year-olds with limited or no digital skills is the lowest across OECD countries (37%). But nearly all adults aged between 55 and 65 lack digital skills. Age gaps in Korea are also observed for basic skills, though they are smaller than for digital skills. Less than 2% of Koreans between 16 and 24 lack basic skills in literacy and numeracy, against 30% of Koreans between 55 and 65 (OECD, 2019f). Digital and basic technology divide between the elderly and young generations is primarily due to a sharp increase in educational investment during the period of rapid economic growth in the 1970s and 1980s, as well as insufficient investment in lifelong learning.

In an ageing and increasingly digitalised society, it is essential to keep up with the need for new skills and equip individuals with the adequate skills to participate in diversified and sophisticated online activities. Otherwise, the digital divide will exacerbate well-being inequalities as part of the population will be left behind. For instance with e-commerce, if higher competitiveness of online vendors causes physical stores to close down, it could limit the access to certain products for part of the population (OECD, 2019b). In addition, the COVID-19 outbreak underlines the growing importance of e-commerce as consumers increasingly switch to online shopping to avoid further spreading of the virus (Box 3.1). In addition, individuals with a well-rounded skill set (literacy, numeracy and digital) are better prepared to face changes in their job content induced by digitalisation and automation (OECD, 2019f). This is particularly relevant for workers in Korean SMEs whose jobs face higher automation risk than in larger companies (44.3% against 36.5%, OECD 2020b). Having a well-rounded skill set can help workers be re-assigned to non-routine tasks more easily.

Figure 3.13. The digital skills gap between generations is the highest among OECD countries

Share of adults with limited or no digital skills, by age group, 2012 or 2015
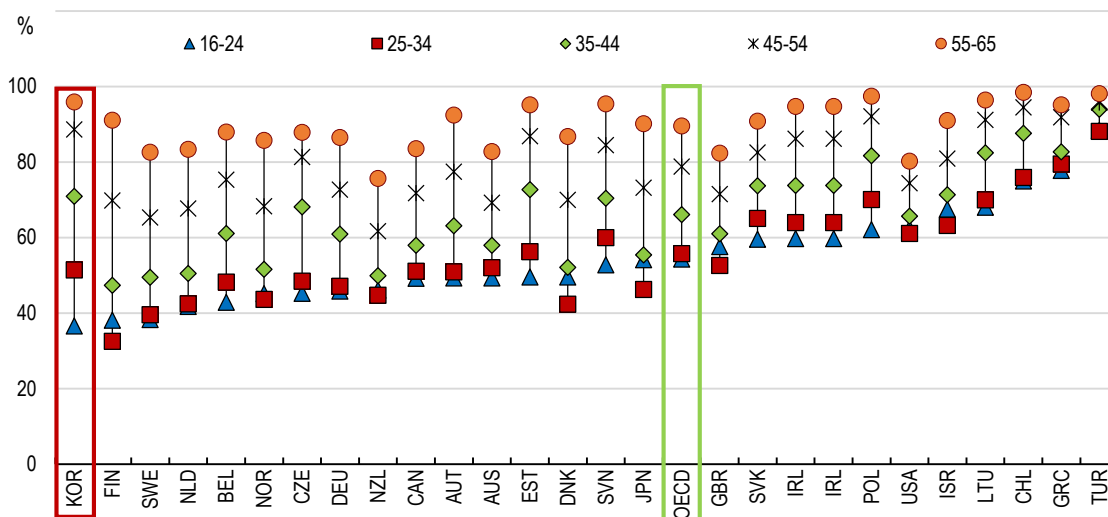
Note: No digital skills' includes adults who have had no computer experience, failed the ICT core test or opted out of taking the test. 'Limited digital skills' includes adults scoring below or at level 1 of proficiency in problem solving in technology-rich environments
Source: OECD Survey of Adult Skills (PIAAC).

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Policies supporting digital adoption and productivity need strengthening

The lack of adequate skills and knowledge is the main barrier to the diffusion of digital technologies among firms and workers. Preparing individuals to thrive in a digital society begins in families and at school and continues at work with on-the-job learning and training. The lack of strong innovation networks between SMEs and academia or large firms and the presence of stringent regulations hinder the adoption and diffusion of digital technologies. R&D and commercialisation of new products and services should be further promoted in innovative and productive SMEs. Stringent barriers in product markets and in services should be lowered to adjust to the rapid development of digital innovations.

Better quality training for teachers and SME employees is crucial

Teachers play an important role in ensuring that students and workers develop relevant skills to thrive in the context of the digital transformation, but also in raising awareness of the risks associated with new technologies. Teachers' digital competencies are key in that regard and there is a positive relationship between teacher problem-solving skills in technology-rich environments and student performance in computer problem solving and computer-based assessment of mathematics (OECD, 2019f). In Korea, the share of teachers (including adult learning teachers) with high digital skills is low compared with the most advanced OECD countries (Figure 3.14). The lack of digital skills raises issues amid the COVID-19 outbreak as teachers had to switch to online teaching (Box 3.1). Among OECD countries, a relatively high share of Korean teachers have the "use of ICT for teaching" included in their formal education or training, or in their recent professional development (for instance attending courses and seminars outside of school). Nonetheless, more than half of Korean teachers do not feel sufficiently prepared for the use of ICT for teaching and the share of teachers in high need of training in ICT skills for teaching is above the OECD average (Figure 3.15). The quality of their training in ICT skills should be improved. As is currently discussed by the government, lifelong learning teachers should have mandatory refresher training to update their skills on a regular basis. Furthermore, to attract highly-qualified lifelong learning teachers, and hence increase the quality of training, their working conditions and wages should be enhanced. Their pedagogical and professional skills could also be publicly highlighted, as it is the case with Singapore's adult education network SkillsFuture SG (OECD, 2020b).

Workers with ICT professional skills (such as programming and data analytics) are needed to support the diffusion and the efficient use of digital technologies, as well as to compete in the digital economy (Cho et al., 2019; Sorbe et al., 2019). In terms of graduation fields, the share of Korean tertiary graduates is the second to Germany among OECD countries in natural sciences, engineering, ICTs, and creative and content fields (Figure 3.16). These qualifications are especially useful in increasingly digitalised working environments (OECD, 2019b). Artificial intelligence and big data have proven to be core technologies to tackle the COVID-19 outbreak, which implies that more specialists and high-level researchers in these technologies are needed (Box 3.1). The Korean government started to take steps in this direction by promoting plans to train more experts in fourth industrial revolution core technologies. In December 2019, the government initiated a strategy promoting the adoption of artificial intelligence, which includes making artificial intelligence courses compulsory in primary and secondary schools, opening artificial intelligence departments in colleges and providing training to the military and public officials. Such courses and training should be extended to other fourth industrial revolution core technologies like big data and training should be provided to private sector workers as well.

Figure 3.14. The share of teachers with high digital skills is relatively low in Korea

Share of top performing teachers in problem solving in technology-rich environments, by country
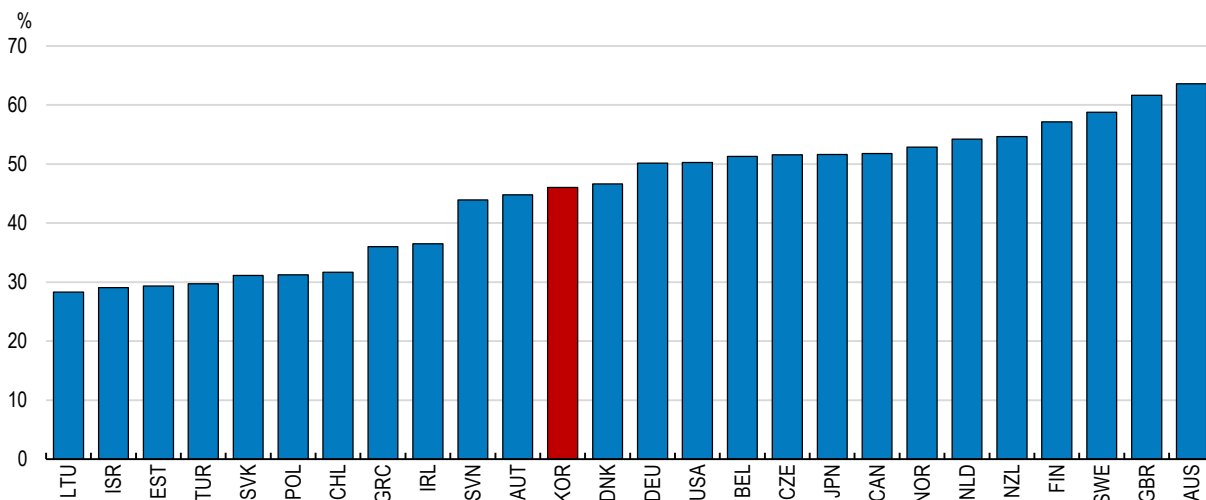
Note: Top performers are defined as scoring Level 2 or 3 in problem solving in technology-rich environments.
Source: OECD (2019f), calculations based on OECD Survey of Adult Skills (PIAAC).

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Figure 3.15. Teachers can further improve their use of ICT for teaching

Share of teachers reporting about the "use of ICT for teaching"
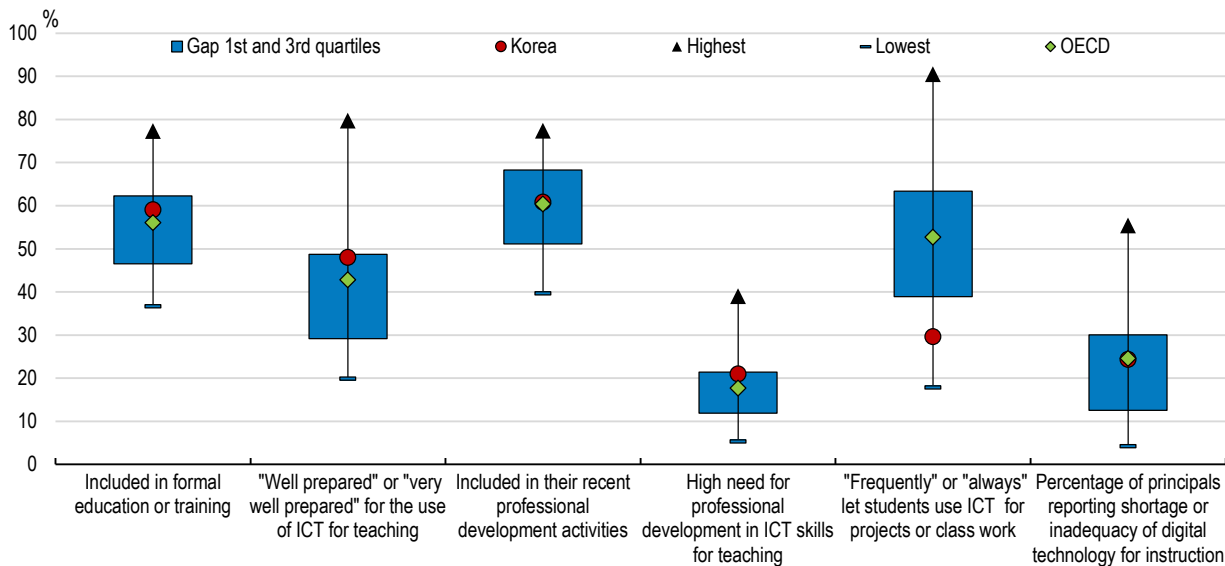
Source: OECD, TALIS 2018 Database, Table I.4.13, Table I.4.13, Table I.5.18, Table I.5.21, Table I.2.1 and Table I.3.63.

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Figure 3.16. The share of tertiary graduates in science, engineering and ICT is high
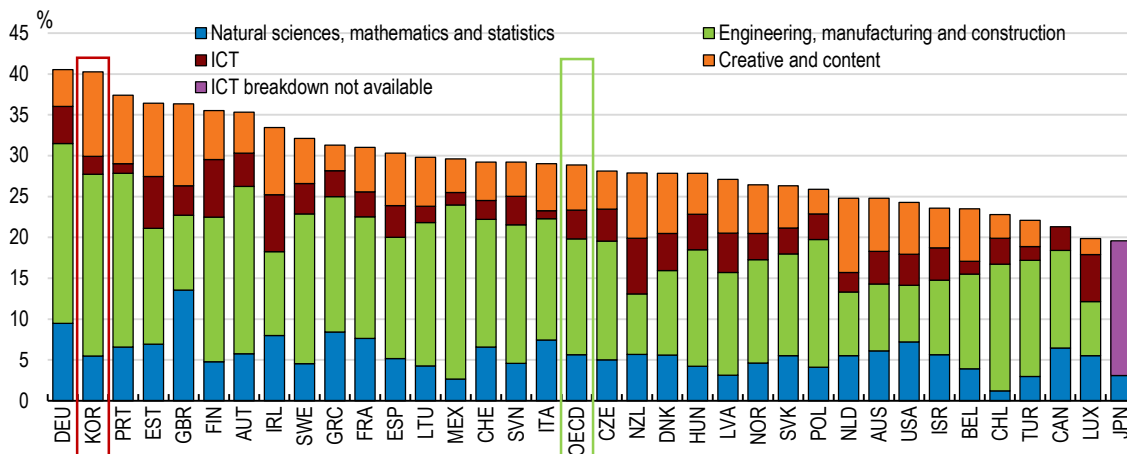
As a percentage of all tertiary graduates, 2016

Note: The 'Creative and content' field includes arts (including graphic design), journalism and information.
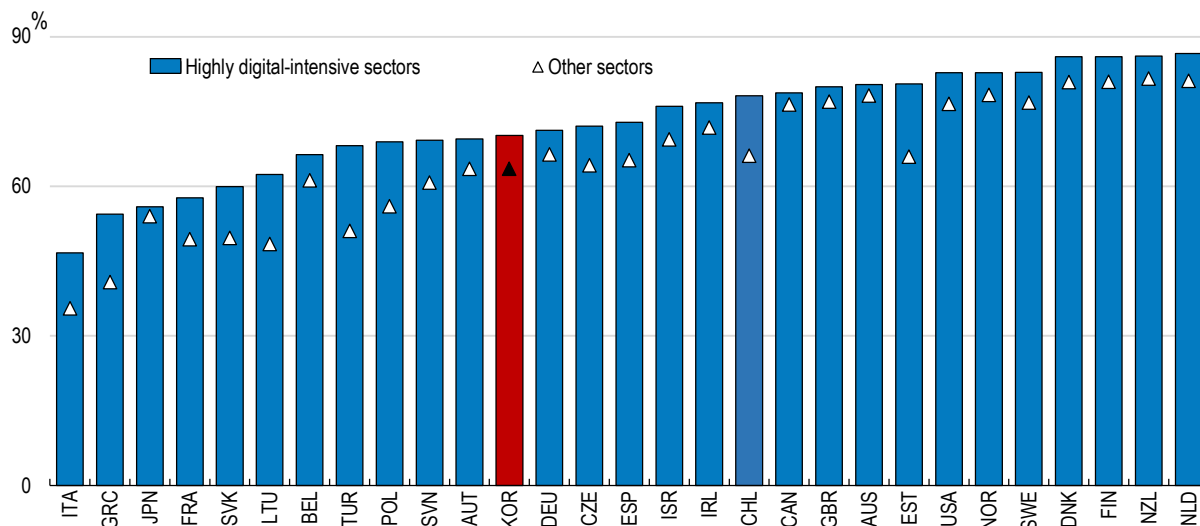Source: OECD (2019b), calculations based on OECD Education Database, September 2018.

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Firm-based training can complement and update academic qualifications and enhance the generic digital skills of all workers, as well as complementary skills like managerial skills. High managerial skills are required to improve business processes and are associated with higher digital adoption and productivity (Bloom et al., 2019; Sorbe et al., 2019). Among OECD countries, workers in very digital-intensive sectors are more likely to receive formal firm-based training leading to official qualifications than workers in other sectors. Korea has scope to increase firm-based training, as even in very digital-intensive sectors, participation is relatively low compared to OECD frontrunners (Figure 3.17). The lack of access to training in SMEs, compared to larger firms, and the low quality of training are important issues. In 2015, 52% of SMEs provided only legally mandatory training (mostly industrial safety and health training) or no training at all to their workers, based on PIAAC data. Compared to other OECD countries, Korean SME workers seem to be less satisfied with their training, with less than a third of them finding it useful. The government is already addressing issues related to the lack of training participation in SMEs. Nevertheless, there is still a lack of information about the benefits of training, available training options and their quality, as well as available financial support (OECD, 2020b). Career guidance services can raise SME workers' awareness of training opportunities and understanding of their training needs. However, Korea counts numerous competing online career guidance platforms (HRD-net, Neulbaeum, Work-Net, Q-Net, regional lifelong learning portals, K-MOOC, Smart Tech Education Platform), which makes finding information more difficult for workers. The government should merge the many online career guidance portals into a single one to centralise information on available training programmes and help users navigate training options. Targeting adult learning programmes on SME managers would help ensure they are aware of the potential of digital technologies and hence supportive of workers training. Korea could learn from other countries like the United Kingdom, Mexico, New Zealand and Australia, where special management programmes are provided to SMEs' CEOs and owners. Financial incentives to reduce training costs are numerous for Korean SMEs and are funded by the Employment Insurance for SMEs that meet a number of criteria. Making these criteria less restrictive would allow more SMEs to be eligible to these government-supported subsidies. Furthermore, financial incentives should be aligned to SMEs' training needs and hence be more generous for innovative training contents or methods that better fit SMEs' need. Finally, developing an online guide like in Ireland (Supporting SMEs Online Tool) would help SMEs be aware of all the subsidies.

Figure 3.17. Korea can further increase the share of workers receiving firm-based training

As a share 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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Digital technologies create new opportunities to update and develop new skills throughout life, for instance via distance and modular learning. Education systems such as massive open online courses (MOOCs) provide a wide range of courses to anyone at any age by top universities, the business sector, international institutions or independent experts. In Korea, MOOCs like those provided by Tooling U-SME specifically for manufacturers and their workers can teach needed digital manufacturing skills (Kim et al., 2018). E-learning allow studying and working at the same time and even obtain full degrees with modular learning, providing flexibility to workers and savings to firms, especially in SMEs where lack of time is the main barrier for workers (OECD, 2019f; OECD, 2020b). Korea has the third highest participation rate in online courses in the OECD, after Mexico and Finland (Figure 3.18). Drawbacks of e-learning include the lack of information on their quality and the risk of exacerbating inequalities. Indeed, youth and high-educated adults are more likely than older and low-educated adults to further develop their skills through such education systems. In Korea, 59% of youth aged 16-24 have used Internet online courses in 2019, while this share is only 20% for people aged 25-54 and 5% for 55-74 year-olds (Figure 3.18). A similar pattern is observed in other OECD countries, but the age gap is the highest in Korea. More basic ICT courses should be provided to older and low-qualified adults who are also over-represented in SMEs (OECD, 2020b). Regarding older adults, Korea could take advantage of existing infrastructure like senior universities which help improve seniors' well-being and could operate as an extension of adult lifelong learning (Jun and Evans, 2019). Users are over 60 years old and courses are mainly related to hobbies and health maintenance. But courses dedicated to ICT could be introduced, either as basic courses or as university-level courses like in Germany's Universities of the Third Age (Schmidt-Hertha, 2019). Finally, the government should collaborate with education and training providers, employers, job-search agencies and MOOC platforms, to increase participation in open education and expand the use of distance and modular learning on the job, as well as define standards and good practices to better signal quality courses (OECD, 2019f).

Figure 3.18. The participation in online courses is the third highest in Korea

Share of individuals participating in online courses, in 2019 or latest available year
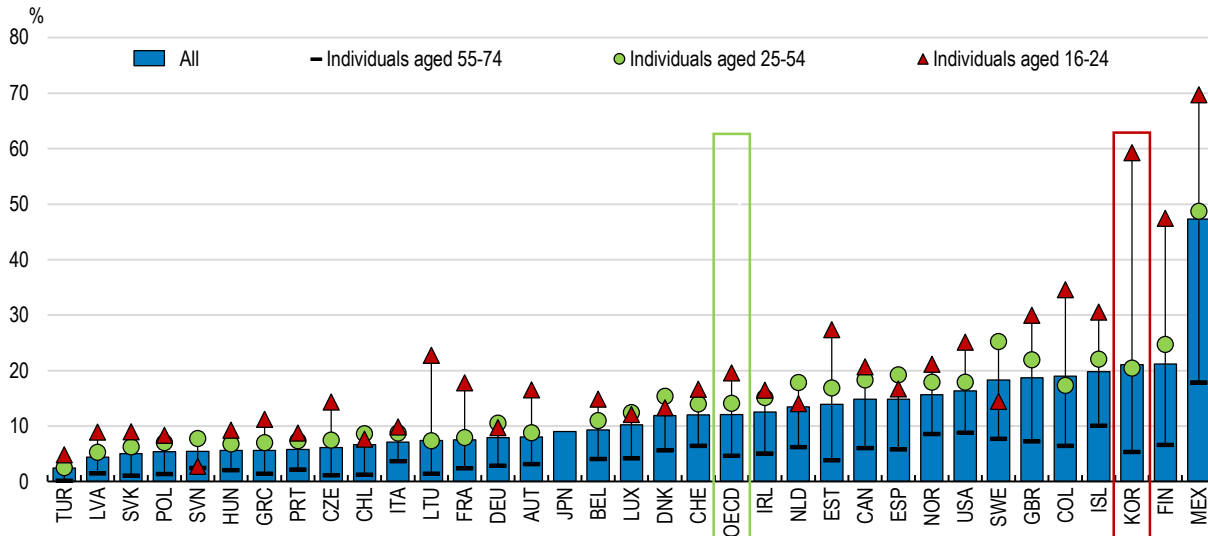
Note: Data refer to 2018 for Canada, Columbia, Japan and Mexico, 2017 for United States.
Source: OECD ICT Access and Usage by Individuals Database.

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R&D support needs to better target innovative and productive SMEs

The digital divide between Korean SMEs and large enterprises is high and Korean SMEs do not take advantage of advanced technologies enough to enhance their productivity. Access to finance is critical for SMEs to adopt innovation and scale up. Overall, SMEs in OECD countries face financial barriers to the adoption of innovation, especially young firms, start-ups and innovative ventures (OECD, 2019c). The Korean government supports SMEs through the Korea Small Business Innovation Research (KOSBIR) programme and R&D grants since 1998. KOSBIR is based on the US Small Business Innovation Research (SBIR) programme that supports SMEs in three phases: feasibility, R&D and commercialisation. Compared to SBIR, KOSBIR dedicates most of the funding to the R&D phase, at the expense of the feasibility and commercialisation phases. Reallocating financial support for turning successful technology R&D into commercial applications could help SMEs convert their R&D inputs into economic benefits. The proportion of firms able to launch new products or significantly improve existing products is much lower in smaller firms than in larger ones. The lack of funds and of market analysis and research consulting on project feasibility are considered as the main barriers to commercialisation, especially for small firms (Yang, 2018). Promoting e-commerce could help SMEs sell their products to a wider range of consumers. For instance, Israel's National Digital Programme has a component dedicated to e-commerce with an assistance package that includes subsidised training and grants to establish a digital marketing system.

However, when it comes to support commercialisation, financial markets and innovative financial services like Fintech should also be considered for funding and expertise on project feasibility. Directing R&D support towards innovative SMEs and boost their productivity requires an efficient selection process of recipients. For instance, recipients of R&D grants selected on the number of their registered patents expanded their investments in R&D, intellectual property rights, tangible assets, human capital and marketing over the period 2010-15, but on average did not show significant improvement in their value added, operating profits and sales, unlike non-recipient SMEs (Lee, 2018a). Fintech brings new opportunities for SMEs seeking finance (OECD, 2019c). In August 2020, the three data bills (Personal Information Protection Act, Information and Communications Network Act and Protection of Credit

Information Act) were to come into effect. Fintech companies are expected to be among the first applicants to have access to anonymised personal data like electricity bills and use them to establish new credit ratings using algorithms. SMEs can then have higher credit ratings than those provided by commercial banks and have access to funding for their R&D and commercialisation projects.

R&D support mainly benefits firms already investing in R&D. Providing SMEs in manufacturing and services with innovation vouchers would encourage them to engage in innovative projects and assess the feasibility of their research projects, for instance by purchasing studies on potential for new technology introduction from universities and research institutions (Kim et al., 2018). Introduced for the first time in the Netherlands in 1997, innovation vouchers are now used by many European countries, as well as in regions of Canada and the United States. Vouchers are usually granted as a one-off payment to SMEs that covers all the eligible costs. In some countries like Estonia, Germany, Ireland and Italy, recipient SMEs are required to provide a share of own-funding (Box 3.3). Evidence of advantages in using innovation vouchers include increased R&D projects, reduced time-to-market, and further collaboration with academia (Cornet et al., 2006; Matulova et al., 2015; Sala et al., 2016). Overall, innovation vouchers would help developing innovation networks, which are limited in Korea, and facilitate the diffusion of digital technology (*2018 OECD Economic Survey of Korea*).

Box 3.3. Innovation vouchers for SMEs: case studies of selected European Union countries

Voucher programmes consist of grants given by local, regional and national government to private firms, usually SMEs, as an incentive to adopt new technologies or services, or to invest in skills. In the European Union, such vouchers mainly aim at assisting SMEs in investing in innovative solutions or services, or acquiring machinery that will facilitate innovation (digital or not). Some vouchers specifically target training of staff and/or citizens to increase their basic or digital skills (for instance in Poland).

Activities covered by these vouchers include consultancy services, knowledge transfers from research institutes, access to research centres and their testing facilities, first-time contacts between entrepreneurs and/or research centres, nationally or internationally and investments in ICT instruments, among others.

Table 3.2. Main innovation vouchers currently available to SMEs in the European Union

	Amount	Beneficiaries	Purpose	Number of vouchers granted
Austria	Maximum: EUR 12 500 Total: EUR 29.3 million	Smaller firms without R&D staff	Enlist the services of research institutions and pay for these services	4 442 in 2016
Denmark	Large voucher: EUR 13 400 Small voucher: EUR 3 350 Total envelope: EUR 12.3 million (over 2018-21)	SMEs	Strengthen digital and e-commerce capabilities and increase competitiveness	Not available (target of 2 000 by 2021)
Estonia	Maximum: EUR 4 000 Own funding rate: minimum 20% Total envelope: EUR 4 million (over 2014-20)	SMEs cooperating with a higher education institute, test laboratory, or intellectual property experts	Supports the creation of first-time contacts between entrepreneurs and innovation service providers	Up to 4 000 from autumn 2015 until summer 2019
Germany	Maximum: EUR 1 100 (excluding VAT) for a day of consulting services (maximum 30 days of consulting services in a period of up to 6 months) Own funding rate: 50%	SMEs with less than 100 employees	Advance recipients' digitalisation in IT security, digital marketing and digitalised business processes	863 in 2018 1238 in 2017
Ireland	Maximum: EUR 2 500 (excluding VAT) Own funding rate: 50%	SMEs with limited online trading presence and 10 employees or less, EUR 2 million or less in	Invest in developing e-commerce capability	5 000 since 2014

	Total envelope: EUR 7.3 million since 2017	turnover and at least 6 months of trading		
Italy	Maximum EUR 10 000 Own funding rate: 50% Total envelope: EUR 45 million (over 2017-19)	Micro enterprises and SMEs in the pursuit of the digitalisation of their processes and modernisation of their technologies	Encourage investments in ICT innovation and digitalisation among micro enterprises and SMEs	10 000

Source: Backer Gonzalez Salido (2019).

In addition to promoting collaboration between SMEs and academia, encouraging collaboration between SMEs and large enterprises would enhance innovation diffusion, for instance through an open collaborative platform to exchange new products, services and big data (Fourth Industrial Revolution Committee, 2019). The United States and other OECD countries focus on the importance of networks for the growth phase of start-ups and SMEs (Box 3.4). The Korean steelmaker POSCO paved the way for a successful collaborative platform between SMEs, large enterprises and academia. It started introducing new technologies like big data in 2015. In July 2019, POSCO became the first Korean smart factory designated as "Lighthouse Factory" by the World Economic Forum, which establishes a list of global leading factories applying core fourth industrial revolution technologies (artificial intelligence, big data and IoT). One of POSCO's special features is the collaboration with academia, SMEs and start-ups to build its own smart factory platform (World Economic Forum, 2020). POSCO collaborates with universities like POSTECH and UNIST to provide special training in artificial intelligence. This collaboration has brought more than 60 artificial intelligence experts in POSCO. By providing big data to a SME specialised in data mining like ECMiner, POSCO succeeded in optimising their equipment with artificial intelligence. The academics, SMEs and start-ups that collaborated with POSCO can help constructing another smart factory based on POSCO's technology (POSCO, 2020).

Box 3.4. Helping SMEs scale up: selected country examples

Since its inception in 1979, the US Small Business Development Center (SBDC) network has grown from a few centres in six states to a nationwide network of nearly 1 000 centres at the service of approximately one million small business owners and aspiring entrepreneurs each year. SBDCs provide one-on-one counselling and training to help micro enterprises and SMEs start their business and grow. The SBDC network is a partnership that includes the US Congress, the US Small Business Administration (SBA), the private sector, colleges, universities, state and local governments. Half of SBDC funding is provided by the SBA, and the other half by the other partners and through donations. SBDCs offer services in general management, assistance in getting financing and more specialised services for gazelles, such as assistance to expand their market at the international level. They also monitor and evaluate business performance using indicators like jobs creation, sales, access to capital, exports and the number of government contracts.

Over a more recent period, other OECD countries introduced similar programmes to help SMEs grow through mentoring and collaboration between companies, the public sector and academia. In 2014, Korea launched the Tech Incubator Programme for Start-ups, which is modelled on Israel's Technology Incubator 1991 programme (*2018 OECD Economic Survey of Korea*). Both programmes provide incubation and mentoring, and they are funded by government R&D combined with angel investors in the case of Korea and venture capitalists in the case of Israel. Over 2018-20, the European Innovation Council supports top-class innovators, entrepreneurs, small companies and scientists for scaling up internationally, by offering new networking, mentoring and coaching opportunities as well as strategic advice for upgrading the European innovation ecosystem. Several countries have used network-based approaches like cluster policies to strengthen industry-science linkages and cross-sectoral interactions (Baltic Sea Region countries, Canada, Korea, Spain).

Source: https://americassbdc.org/; 2018 OECD Economic Survey of Korea; Choi (2019); OECD (2019c).

Barriers to the adoption and diffusion of digital innovations are too high

Regulatory frameworks are often unable to adjust to rapid technological innovations, like FinTech services or gig economy platforms. Stringent regulations limit possibilities to experiment and create uncertainty for innovators, hampering investment in digital innovations and the emergence of new business models (Planes-Satorra and Paunov, 2019). Furthermore, stringent regulations are barriers to competition and reallocation, hindering productivity growth. Reducing them can boost the diffusion of digital tools and maximise their impact on productivity (Sorbe et al., 2019, 2018). Product market regulations in Korea are among the most stringent in the OECD, especially state involvement in business operations, barriers in service and network sectors and barriers to trade and investment, which are among the highest across OECD countries (Figure 3.19). Reducing barriers to trade and investment would promote foreign investment in R&D and SME innovation through better connection to global innovation networks (*2018 OECD Economic Survey of Korea*). Services in Korea also face high trade barriers in transports and telecommunication (Figure 3.20). These sectors are important for the development of manufacturing servicification and reducing barriers in these sectors would enhance productivity. Indeed, there is evidence of a positive association between services deregulation and productivity of manufacturing firms using services as inputs, for example in the case of Czech Republic (Arnold et al., 2011).

Figure 3.19. Korea has high regulatory barriers to competition

Index scale 0 to 6 from most to least competition-friendly regulation, 2018
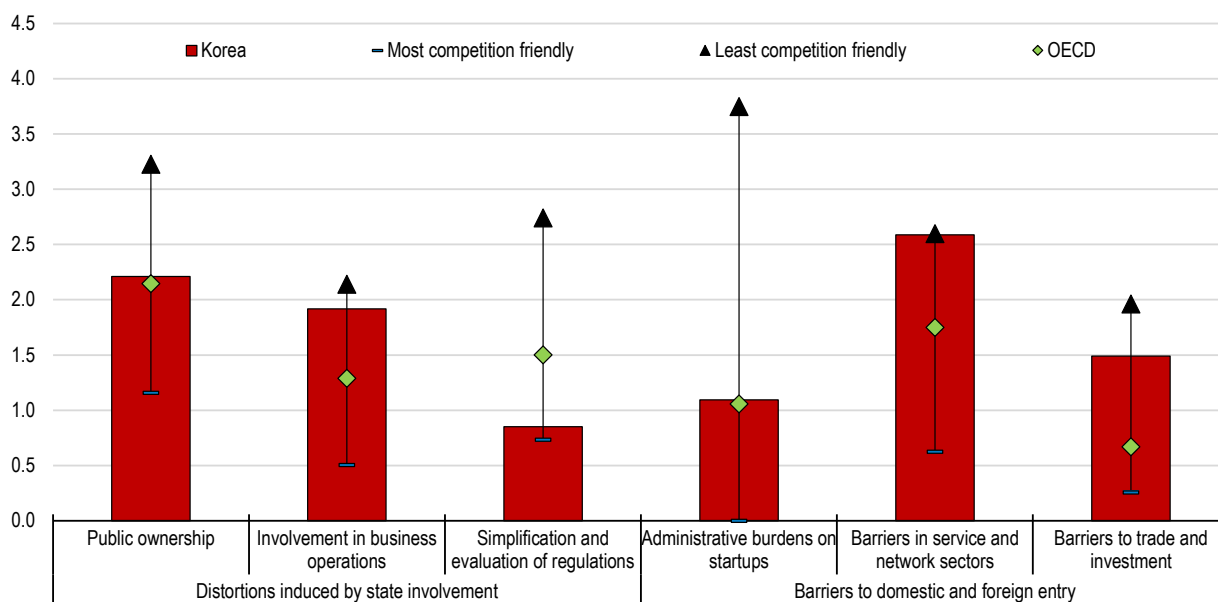
Source: OECD Product Market Regulation Database.

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Services like ride hailing and medical services are subject to strict regulations, hindering the development of new business models or the commercialisation of new digital products. Companies like Uber and Kakao Carpool struggle to service the Korean market, because of the "Passenger Transport Service Act" that limits commercial use of private cars during rush hours (7-9 in the morning and 6-8 in the evening). Huinno had to delay the launch of its wearable electrocardiogramme monitoring system until 2019, despite finalising its development in 2015 (before the Apple 4 watch) because of the stringent regulations on

medical services. Regulatory sandboxes are recommended to enhance regulatory flexibility as they allow firms to experiment innovative products and business models without being subject to all existing legal requirements (*2018 OECD Economic Survey of Korea*). The government has introduced regulatory sandboxes since January 2019 in areas such as FinTech, the medical sector, manufacturing, electronics, telecommunication, energy and mobility. In terms of digital technology, regulatory sandboxes have been approved for app-based platform technology, IoT, big data, blockchain, artificial intelligence and virtual reality. Huinno was among the first firms to benefit from the regulatory sandboxes programme. Furthermore, amid the COVID-19 outbreak, the ban on telemedicine services was temporarily lifted, allowing patients to consult their doctors without risking mutual exposure to the virus (Box 3.1). In 2019, 195 projects were approved by the regulatory sandbox system and over 200 projects are aimed at in 2020. The government also announced the designation of regulation-free special zones. Like regulatory sandboxes, they allow firms to experiment innovative technologies in designated areas without restrictions from regulations (digital healthcare in Gangwon, blockchain technology in Busan, autonomous driving in Sejong and so forth). After four years at most, if a regulatory sandbox is considered effective and safe, it can lead to the definitive suppression of the regulation that was temporarily waived, its amendment, or the extension of the trial period. It can also lead to the creation of licences with a narrower scope, for example for FinTech companies, which could be allowed to provide some banking services, without needing a full banking licence. Follow up on this strategy should allow identifying regulation breaches and reviewing regulations, notably in the case of telemedicine.

Figure 3.20. Korea should be more open to foreign entry and competition

Index scale 0 to 1 from least to most restrictive, 2019
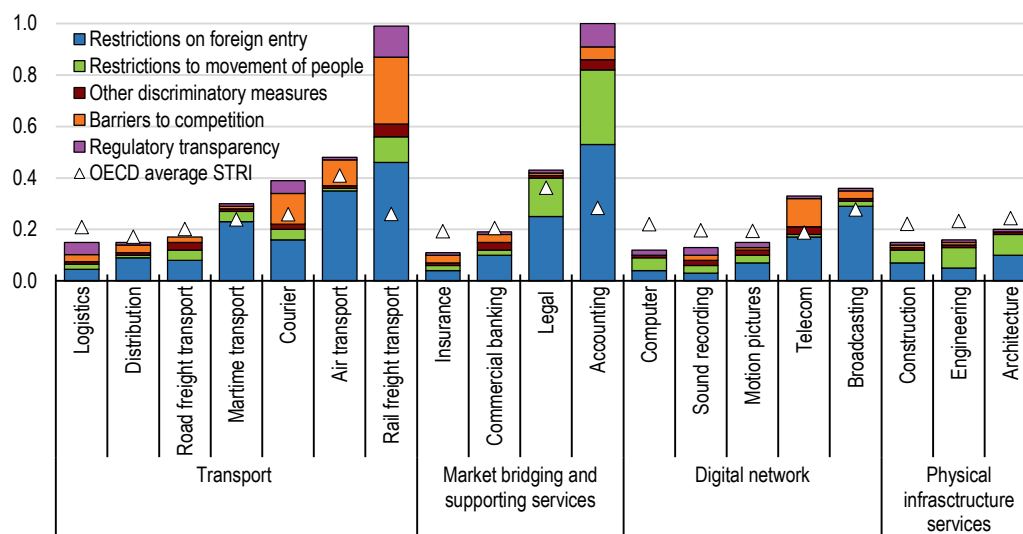
Note: OECD is the simple average across OECD countries. Logistics is computed as the simple average of the four logistic sectors.
Source: OECD STRI database, OECD calculations.

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## Ensuring digital trust is key to digital development and well-being

Digital technologies provide a wide range of innovative products and services to individuals. However, increasing online activities entail higher exposure to digital risks like privacy violations or cyberbullying, as well as higher addiction to digital activities and tools. The COVID-19 outbreak also highlights the importance of digital trust, as individuals and firms rely more on remote services like telework, online classes and e-commerce (Box 3.1). Reaping the full well-being benefits of digital transformation requires ensuring online security, as well as raising individuals' awareness of digital downsides and dangers. This implies the need for better digital education in schools and at work, better digital security technologies and the involvement of the government to lead by example.

Online security must be improved

Ensuring trust in digital technologies is key to promote their adoption and diffusion among individual users. A lack of online security or digital privacy will make users more reluctant to trust such technologies and engage in the digital economy (OECD, 2019g). For instance, better trust in payment services is essential for the development of e-commerce (OECD, 2019e). E-consumers must be protected against financial losses resulting from fraudulent payment card use after completing an online payment. Greater openness of the government to share online data and information previously unavailable to the public can promote innovation in the public sector and improve people's trust in institutions (OECD, 2019g). This in turn can increase people's trust in online activities.

E-government can also encourage firms to adopt digital technologies to exploit synergies between digitalisation in the public and private sectors, and hence increase their productivity (Sorbe et al., 2019). Korea performs well in this regard, ranking second in the world on the United Nations e-Government Development Index (United Nations, 2020; Figure 3.21) and first among OECD countries in open-useful-reusable government data (Figure 3.22). In June 2020, the Ministry of Interior and Safety presented the post-Corona Digital Government Innovation Development Plan, following the October 2019 Digital Government Innovation Promotion Plan. Its goal is to promote digitalisation in the public sector. The expansion of non-face-to-face services will be accelerated through the use of mobile ID cards and the MyData portal, which will allow people to use government services from their smartphones from 2021, as well as download personal information held by public institutions, and submit that information directly to public authorities and banks. Besides, online education will be expanded. The Korean government also plans to increase the provision of customised services related to health check-ups, national scholarship applications, civil defence education or tax payments. The openness of public data will be further promoted to strengthen cooperation between the public and the private sectors, and support new industries such as autonomous driving and healthcare. Finally, the government will further develop digital infrastructure in the public sector by increasing 5G wireless networks and building a security control system using artificial intelligence. Civil servants will also follow more training on digital government innovation (Ministry of Interior and Safety, 2020).
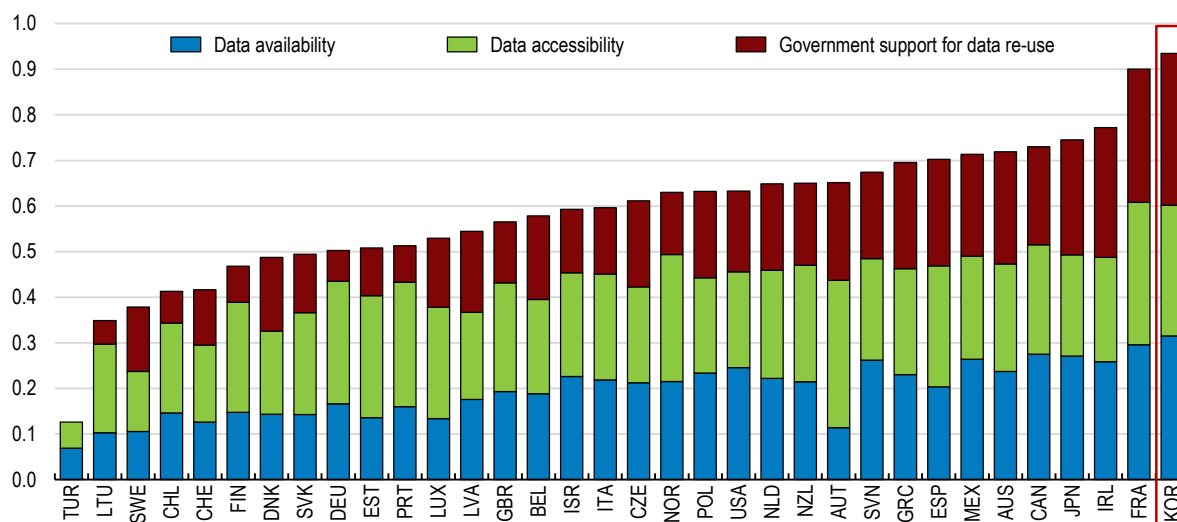
Figure 3.21. Korea is a leader in e-government
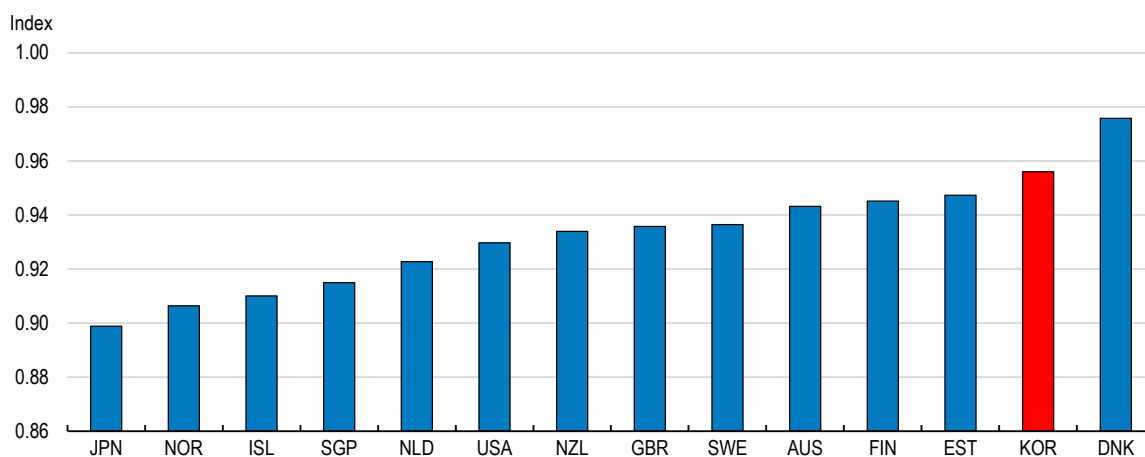
Source: 2020 United Nations E-Government Survey.

Figure 3.22. Korea has the highest score in open-useful-reusable government data

OURdata Index scores in the dimensions of data availability, accessibility and reusability, 2019

Source: OECD OURdata Index on Open Government Data.

However, Korea has a relatively high share of individuals reporting security incidents, even though this share has significantly decreased since 2010 (Figure 3.23). Security incidents like losing information, time or device damaging after catching a computer infection (virus, worm, Trojan) are the most frequent, while financial losses resulting from fraudulent messages (phishing), fake websites asking for personal information (pharming) or fraudulent payment card use affect fewer users. For such security incidents, Korea is close to the OECD average. However, Korea has the second highest share of Internet users experiencing privacy violations in the OECD (malicious attacks, poor data security, accidental publication of user data), which may hold back the development of on-line applications (Figure 3.24). There are also growing concerns across countries about "predictive privacy harm" related to the use of big data by

companies to predict individuals' preferences and behaviour, which can harm their physical safety and mental health (OECD, 2019g).

Figure 3.23. Online security incidents are relatively frequent in Korea

Percentage of individuals who report having experienced security incidents
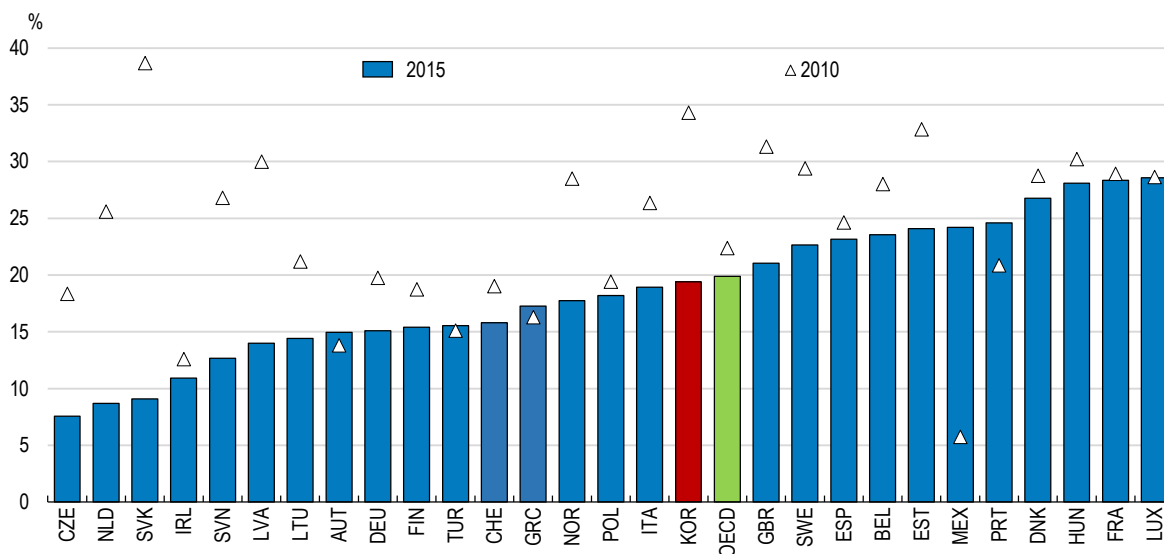
Note: 2017 for Korea and Mexico; 2014 for Chile and Switzerland. For Korea and Mexico, the share in 2015 is respectively 23.4% and 28.4%.
Source: OECD (2019g), calculations based on OECD ICT Access and Usage by Individuals Database.

StatLink https://doi.org/10.1787/888934157853

Figure 3.24. Privacy violations are second highest in Korea

Share of Internet users who experienced abuse of private information on the Internet, 2015
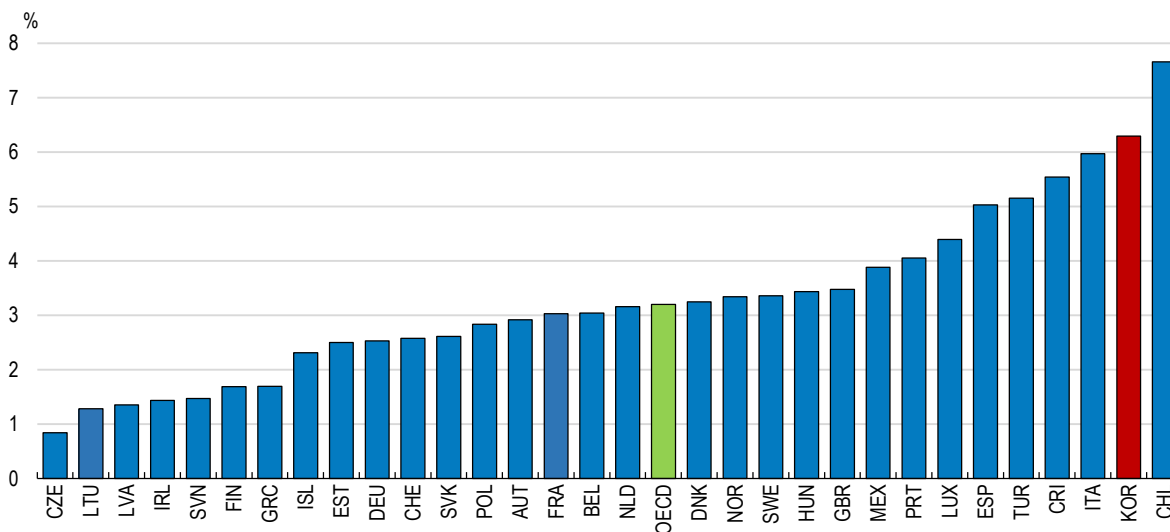
Note: 2017 for Korea and Mexico; 2014 for Chile and Switzerland. For Korea, the share in 2015 is 7%.
Source: OECD (2019b), calculations based on OECD ICT Access and Usage by Individuals Database.

StatLink https://doi.org/10.1787/888934157872

Better online security can be achieved through higher skills, more robust digital security technologies and the involvement of the government to lead by example. High-skilled individuals are more likely to be aware of online security threats and find solutions to address them, like managing the access to personal information online, using anti-tracking software and changing website settings to limit cookies (OECD, 2019f). A well-rounded set of skills in literacy, numeracy and problem-solving in technology-rich environments improves individuals' abilities to protect themselves against online security breaches. Additional education from school and training explicitly dedicated to such digital issues can also increase individuals' awareness and help them adopt a safer online behaviour. Digital technologies such as blockchains can also be powerful tools to strengthen safety of transactions and information exchange or block hacking (quantum cryptography communication). In this regard, Korea lags behind countries like the United States, Japan or China (IITP, 2019). Research and investment in these next-generation security technologies must be promoted with financial incentives.

Towards a sound digital society and culture

Other downsides of digital transformation include cyberbullying and other forms of online harassment like cyber-stalking, as well as excessive dependence on the Internet or smartphones. Hidden behind the anonymity provided by the Internet, bullying perpetrators feel freer to harass their victims in their public and private lives, at any time, by spreading false rumours or sending threats. Such online harassment can generate severe mental health problems, leading in extreme cases to suicide (OECD, 2019g), as was the case for two K-pop singers in 2019. Children and teenagers are more exposed to online harassment, especially as smartphones keep them connected at all time to the Internet and social networks. Parents with higher digital skills are more likely to educate their children about a sound use of the Internet and address cyberbullying issues (OECD, 2019f). ICT education at school, as well as information campaigns on Internet cyber violence prevention are key to promote a sound web culture.

The increasing use of new technologies and devices may also generate health problems (such as sleep disorder, depression or stress) and harm social relationships, mainly because of the constant connectivity and the wide range of online activities (Montagnier, 2016). This mainly affects youth and children who can end up missing school. In Korea, youth aged 10-29 are at much higher risk of Internet or smartphone addiction than other age categories. In the case of smartphone addiction, risks are also higher for children less than 10 years old (Figure 3.25). Provide specific and compulsory ICT courses in school and training in firms, can help raise awareness of dangers related to digital addiction and reduce it.

The relationship to work has changed amid the COVID-19 outbreak as more firms resorted to telework to contain the spread of the virus. In the United States 5% of working days were spent at home before the outbreak, against 40% during the pandemic (Bloom, 2020). Korean firms also rapidly turned to telework. Based on a survey of 300 enterprises, 45.8% of large enterprises, 30.6% of mid-sized enterprises and 21.8% of SMEs practiced teleworking after the COVID-19 outbreak, against respectively 9.7%, 8.2% and 6.7% before the outbreak (Korea Chamber of Commerce and Industry, 2020). The Korean government also encouraged the use of flexible work arrangements in SMEs – staggered hours, work from home, remote work – by simplifying the procedures to apply for a subsidy from late February 2020. The subsidy can go up to KRW 5.2 million (USD 4 300) a year per worker. After the COVID-19 crisis, the number of teleworked days is expected to decrease, while remaining higher than before the pandemic. In the United States, 20% of working days are likely to be spent at home – four times higher than before the COVID-19 crisis (Bloom, 2020). Beyond containing the spread of the virus, teleworking can improve firms' productivity, workers' well-being and help tackle other economic and social issues, such as gender and regional inequalities, housing, carbon emissions and traffic congestion (Bloom et al., 2014; OECD, 2020c). However, teleworking can also have adverse effects, such as lower productivity for workers who lack an appropriate working environment at home, less innovation because of impaired communication or increased hidden overtime. To make the most of teleworking, policymakers can promote the diffusion of

best management practices, self-management and ICT skills, investment in home offices, and fast, reliable and secure ICT infrastructure for firms and workers (Bloom, 2020; OECD, 2020c).

Figure 3.25. The share of Korean youth at risk of addiction to Internet and smartphones is high
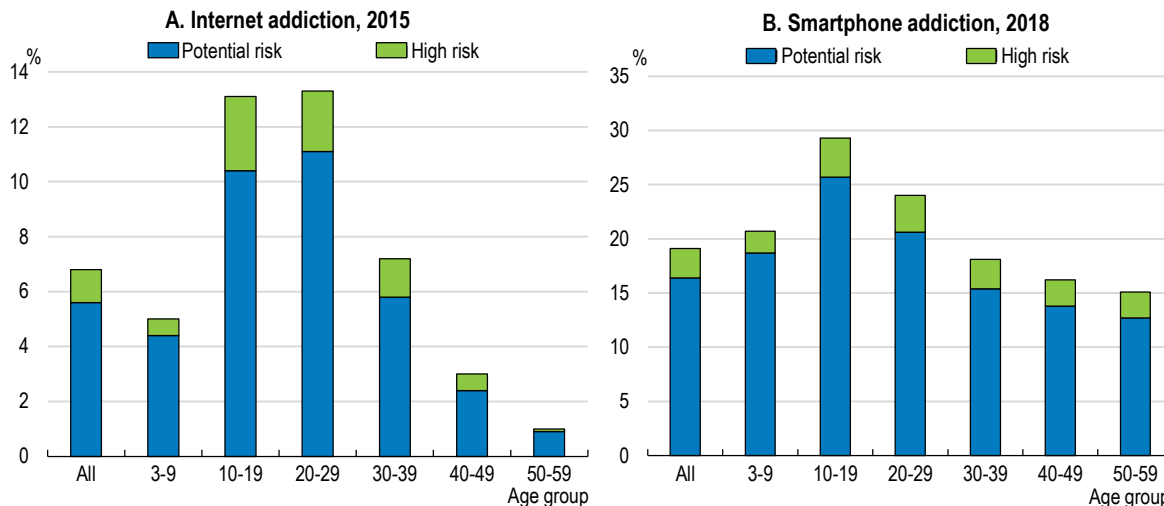
Source: Montagnier (2016), calculations based on based on National Information Society Agency of Korea (NIA) Survey on Internet overdependence 2015; NIA Survey on smartphone dependence.

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Recommendations to promote the diffusion of technology to tackle the COVID-19 shock and to boost productivity and well-being

Key recommendations in bold

MAIN FINDINGS	RECOMMENDATIONS
Diffusion of technology	
Product market regulations remain tight. However, the government has introduced a programme to shift the burden of proof from the regulated to the regulator and regulatory sandboxes are allowing firms in new technologies and new industries to test their products and business models without being subject to all existing legal requirements. The temporary lifting of the ban on telemedicine during the COVID-19 outbreak illustrates the potential benefits of a timely review of regulations.	**Use regulatory sandboxes to identify excessive regulation and revise or abolish it. Facilitate telemedicine, as long as it is compatible with preserving patient safety and quality of care.**
Subsidies to SMEs have limited effects on promoting growth and boosting innovation and productivity. Despite the efforts of the Korean government to better target subsidies, the latter still allow the survival of low-productivity companies.	**Subsidies to SMEs should focus more on promoting growth and boosting innovation and productivity. Provide SMEs in manufacturing and services with innovation vouchers that can be used to commission R&D and studies on potential for new technology introduction.**
Korean SMEs lag behind in the adoption of sophisticated digital technologies, hampering telework and adaptation to digitalisation.	Further strengthen the collaboration of SMEs with large enterprises and with academia, for instance through an open collaborative network to design new products and services, and exchange data.
Korean SMEs face a lack of funds and expertise on project feasibility, which prevents them from launching new products developed through R&D.	Reallocate financial support for technology R&D to commercialisation for SMEs that successfully developed new technology.
Lifelong learning in digital fields	
SMEs face a lack of skilled workers, notably in digital fields, and their employees have limited access to training. Managers' awareness of the potential of digital technologies is insufficient. The digital skills gap between youth and older generations is the highest in the OECD.	**Provide more basic ICT courses to SME employees and older persons, reduce training costs for SMEs and provide targeted adult learning programmes to SME managers.**
Most teachers feel they are not sufficiently prepared to use ICT for teaching, which has been a hurdle during the COVID-19 school closures.	Make refresher training mandatory for adult learning teachers to update their skills on a regular basis.
Fast technological change implies a constant need to update and develop new skills throughout life. SME employees face time constraints preventing them to participate to training and ICT training in SMEs is scarce.	Leverage distance and modular learning for digital skills and lifelong-learning to provide a wide range of courses and more flexibility to learn and work at the same time, and define standards and good practices to better signal their quality.
Lack of information or difficulties to find it because of numerous competing online career guidance platforms, is another barrier to training for SME workers.	Merge all online career guidance platforms to centralise information on available training programmes for SMEs and help users navigate training options.
More specialists and high-level researchers in fourth industrial revolution core technologies like artificial intelligence and big data are needed.	Introduce courses at school, develop tertiary graduation programmes and provide trainings in firms dedicated to artificial intelligence and big data.
Digital security and well-being	
A relatively high share of individuals experienced privacy violations and youth are at higher risk of Internet and smartphone addiction. Privacy issues also arose in the context of the COVID-19 crisis control measures.	Provide specific ICT courses in schools and training in firms to raise awareness of digital dangers such as cyberbullying, privacy violation and addiction to ICT technologies.
Korea lags behind in the adoption of next-generation security technologies like blockchains and quantum cryptography communication.	Reallocate R&D support to promote research and investment in next-generation security technologies.

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OECD Economic Surveys

KOREA

Economic activity has contracted less in Korea than in other OECD countries, thanks to the prompt and effective reaction of the authorities to contain the spread of the COVID-19 virus and to the wide-ranging government support to households and businesses. Nevertheless, the pandemic generates strong headwinds. Huge uncertainty surrounds global economic prospects and hence the outlook for exports, which are a key engine of the Korean economy. The crisis will have a lasting effect on some economic sectors and therefore require significant resource reallocation. The impact of the COVID-19 pandemic compounds pre-existing challenges, notably rapid population ageing and relatively low productivity in parts of the economy. This Survey draws on the *OECD Jobs Strategy* to outline policies to enable the creation of more and higher-quality jobs and foster more inclusive growth. It also highlights how further digitalisation can boost productivity growth, competitiveness and well-being.

SPECIAL FEATURES: AGEING, DIGITALISATION