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June 24, 2021

Approved By
Asia and Pacific Department

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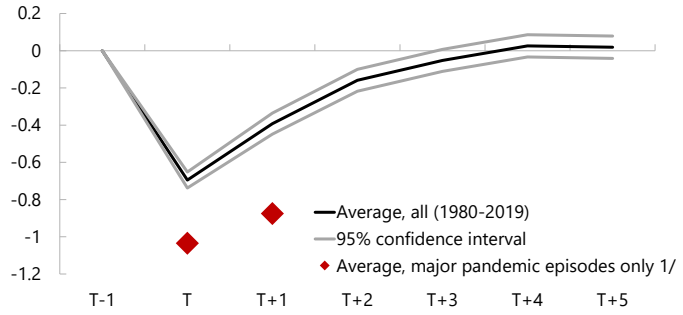
HOUSEHOLD CONSUMPTION DYNAMICS AROUND SHOCKS[1]

The COVID-19 pandemic has had a profound impact on consumption. This paper analyzes the dynamics of consumption growth around past economic and health crises and suggests that the pandemic could have a lingering impact on consumption growth. However, high savings in Singapore, as well as policy support for households, can buffer consumption compression during the crisis and the recovery phase. The paper also looks at the structural drivers of consumption in Singapore in an attempt to understand how it compares to peers.

A. Cyclical Adjustment of Consumption During Crises

1. Consumption growth is cyclical but usually less volatile than GDP growth. Historically, a decline in annual GDP growth by 1 ppt was associated with a simultaneous decline in consumption growth by about 0.7 ppt on average for the period 1980-2019 among advanced economies (AE) (Figure 1).[2] The dampened response may reflect that policies are often implemented to help stabilize household disposable income relative to GDP; it may also reflect consumption smoothing motives, where households dissave (save) during periods of low (high) income to achieve more stable and predictable consumption over time.

Figure 1. Consumption Growth, Associated with Decline in GDP Growth
(Average changes in the real consumption growth rate associated with the 1 ppt fall in real GDP in year T; impulse responses in year T to T+5)



Source: IMF staff estimates
Note: Based on the estimation of impulse responses of annual consumption growth to GDP growth, both in real terms, controlling for up to two lags of both variables, country and year fixed effects, using local projections, based on a sample of 41 advanced economies during 1980-2019.
1/ Showing the estimates using the same method but by limiting the sample only to past major pandemic episodes (SARS, H1N1, MERS, Ebola, and Zika)

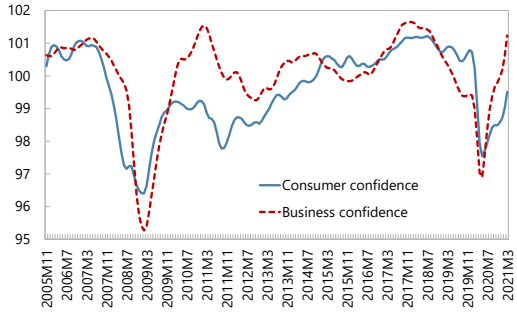
2. The dampening effect of recessions tends to weigh on consumption growth for a prolonged period. In the years following a recession, consumption growth typically recovers as GDP growth rebounds. However, the recovery in consumption tends to be more sluggish than the recovery in GDP. After the initial decline, the impulse response of consumption growth to a shock to GDP growth remains negative for another two years (e.g., all else given, the consumption growth rate following a recession year would be about 0.4 ppt lower than the rate following a normal year,

[1] Prepared by Jiae Yoo (APD).

[2] For a given change in real GDP growth in T, the average changes in real consumption growth over the six-year horizon from T to T+5 are calculated using impulse response estimation by local projections (Jorda, 2005): $CG_{i,t+k} = \beta^k GG_{i,t} + \gamma^k X_{i,t} + \delta_i + \theta_t + \varepsilon_{i,t+k}$, where $CG_{i,t+k}$ denotes real annual consumption growth rate at year $t+k$ in country i; $GG_{i,t}$ is real annual GDP growth rate at year t in country i; $X_{i,t}$ is a vector including two lags of the dependent and independent variable, including country and year fixed effects to control for unobserved cross-country and time heterogeneity.

as indicated by the small negative point estimates for T+1 in Figure 1). This suggests that, even as GDP rebounds, the fundamentals underlying consumption spending may remain softer for longer. Households may be more wary about their future income and employment prospects after the shock. For example, the consumer confidence index among AEs following the global financial crisis (GFC) remained below the pre-GFC peak for a prolonged period, even as the business confidence index fully recovered (Figure 2).

Figure 2. OECD: Confidence Index
(Index; average 1980-2020 = 100, amplitude adjusted)

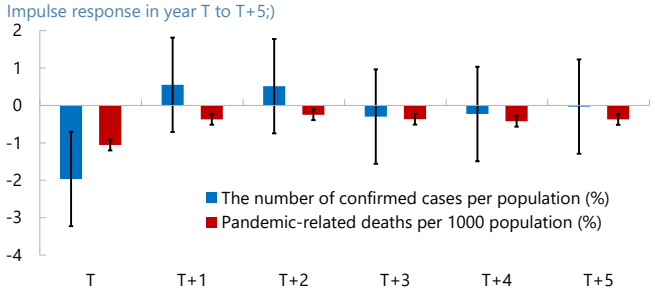


Sources: OECD

3. Consumption tends to slow more sharply during pandemics than during economic recessions. The fall in consumption growth for a given rate of GDP deceleration tends to be steeper in pandemic years than during an economic slowdown: during the past major pandemic episodes in 1980-2019 in AEs, consumption growth declined by about 1 ppt with each 1 ppt fall in GDP growth, compared to the overall average response of 0.7 ppt (red diamonds in Figure 1).[3] This highlights that pandemics affect consumption spending behavior in fundamentally different ways than ordinary recessions. Health risks and related public health measures disrupt consumption by limiting spending opportunities. Uncertainties about the evolution of the pandemic further weigh on consumer sentiment.

4. Pandemics with greater health risks have a stronger and more persistent negative impact on consumption growth. Pandemics with higher infection and mortality rates are associated with a sharper decline in consumption growth (Figure 3), as they involve greater restrictions that limit spending opportunities. As the COVID-19 pandemic recorded far higher case numbers and related deaths than previous pandemics in recent history, many economies have experienced a record contraction in consumption, often far exceeding their GDP contraction. The recovery in consumption growth going forward is also likely to be gradual, as health risks linger, and uncertainties remain high. The OECD consumer confidence index shows that, after the sharp drop at the peak

Figure 3. Consumption Growth by the Severity of Pandemics
(Average changes in the real consumption growth, associated with 1 ppt increase in the percent of cases-to-population and related deaths per 1000 population in year T; Impulse response in year T to T+5;)



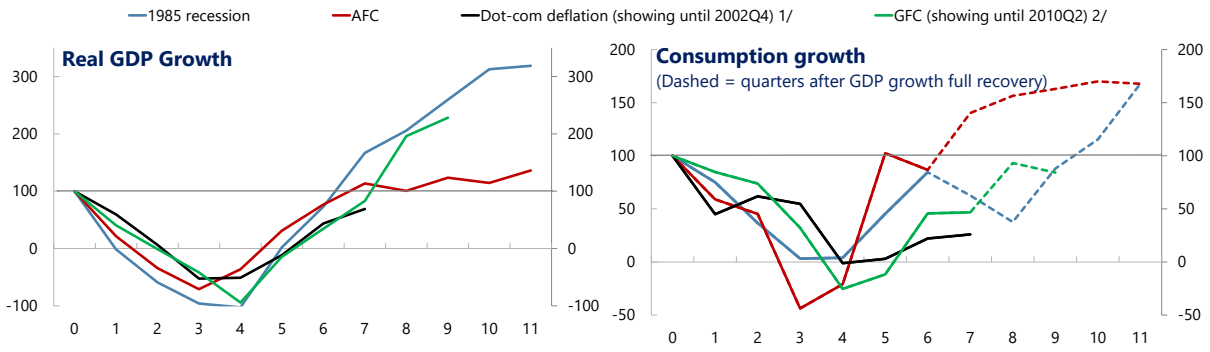
Source: IMF staff estimates
Note: Based on the estimation of impulse responses of annual consumption growth over the year T~T+5 to the measures of the severity of pandemic-related health risks (number of cases per population and deaths per 1,000 population, in %) in the pandemic year T, controlling for up to two lags of consumption growth and the respective pandemic severity measure, country and year fixed effects, using local projections based on a sample of 41 advanced economies during 1980-2019. Past major pandemic episodes in 1980-2019 include SARS, H1N1, MERS, Ebola, and Zika. The bars show point estimates for each year, and the vertical lines around the bars showing the 95% confidence bands.

[3] SARS in 2003, H1N1 in 2009, MERS in 2012, and Ebola in 2014, and Zika in 2016.

of COVID-19, consumer confidence recovered only half of its pre-COVID level by 2021Q1, even as business confidence fully recovered (Figure 2).

5. Turning to Singapore, consumption slumps in recent major recessions tended to be less pronounced but lasted longer than GDP slumps. Consumption growth following the Asian Financial Crisis (AFC) reached rapidly a trough but also recovered quickly. Aside from the AFC, however, the recovery of consumption growth to the pre-crisis peak took longer than the recovery of GDP growth (Figure 4). Consumption growth following the dot-com recession in 2001 remained low for a prolonged period and did not recover before the SARS epidemic struck. The consumption slump following the GFC also extended for longer, similar to many other economies including the U.S. reflecting the sharp drop in wealth and increased uncertainties about income expectations (De Nardi et al., 2012; Mody et al., 2012; Petev et al., 2012).

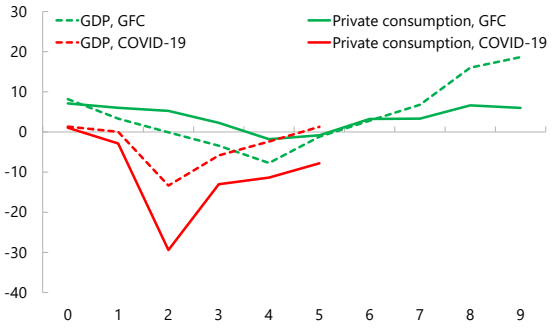
Figure 4. Singapore: Real GDP and Consumption Growth During Past Major Economic Crises
(Normalized the pre-crisis peak growth rate, y/y, to 100; Quarters since the pre-crisis peak on x-axis)



Sources: Haver, IMF staff calculations
1/ Growth slowed again from 2003Q1 related to SARS hit; 2/ Growth slowed from 2010Q3 again, related to slowdown in China and weakness in Europe

6. The COVID-19 pandemic could have a lingering impact on consumption growth in Singapore. At the peak of the pandemic in 2020Q2 with the "Circuit Breaker" in place, private consumption in Singapore contracted by a record 29 percent, y/y, as the economy contracted by 13 percent (Figure 5).[4] Consumption growth rebounded in 2020Q3 with the end of the "Circuit Breaker." However, the pace of recovery has eased significantly since then, likely reflecting lingering health risks and consumer sentiment that remains subdued, which would likely continue to weigh on consumption in the near term.

Figure 5. Singapore: GDP and Private Consumption Growth
(Growth rates, y/y, in percent; quarters since the pre-crisis peak on x-axis)



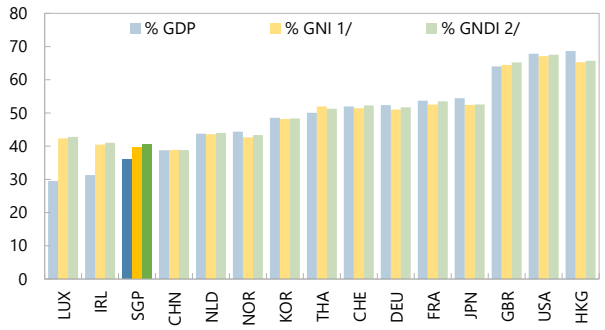
Sources: Haver, IMF staff calculations
Note: T = 1 in 2008Q2 for GFC and 2020Q1 for COVID

[4] Singapore implemented a nationwide partial lockdown known as Circuit Breaker from April 7 to June 1, 2020, to contain the spread of COVID-19. This included closures of all non-essential workplaces, compulsory mask wearing, movement restrictions while testing, and health monitoring.

B. How Can Singapore Boost Consumption Growth? A Look at Structural Drivers of Consumption

7. Consumption levels reflect a variety of socioeconomic conditions that underly consumer behavior. Consumption levels vary across different economies (Figure 6). Greater uncertainty about future income incentivizes precautionary saving and increases the aggregate saving rate (Carroll et al, 2011; Mody et al, 2012). Demographics are another primary determinant of consumption and saving. Households save during their working years and dissave during retirement (Modigliani and Brumberg, 1954 and 1980; Modigliani, 1986). This implies that aggregate consumption rates tend to be higher where the share of working age population is lower. This also interacts with the speed of aging, as an increasing burden to support the elderly in the future would incentivize more saving today. Several other factors also help explain large variations in aggregate consumption rates across economies including income level, credit availability, and interest rates.

Figure 6. Aggregate Private Consumption Expenditure, 2019
(Percent)

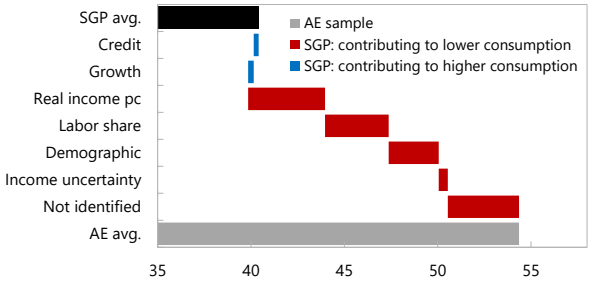


Sources: WEO and IMF staff calculations
1/ GNI = GDP + net primary income account balance
2/ GNDI = GNI + net secondary income account balance

8. The macroeconomic structure also matters for aggregate household saving and consumption. Singapore relies on foreign factors of production (capital and labor) more than most other economies and pays a significant share of GDP to compensate them. This is recorded as a significant deficit in the income balance of the current account. Once accounting for the income deficit, gross national disposable income (GNDI), which remains within Singapore for consumption and investment, is about 86 percent of GDP.

9. The above factors contribute to Singapore's relatively low consumption rate. A regression analysis using a sample of 41 AEs during the period 1980-2019 confirms that the factors discussed above are indeed significantly related to consumption rates (see Annex Table 1.1). Singapore has a relatively low consumption level, as a share of GNDI, compared to its peer AEs. The analysis suggests that demographics, labor share, and real per capita income are important factors in explaining this difference (Figure 7).

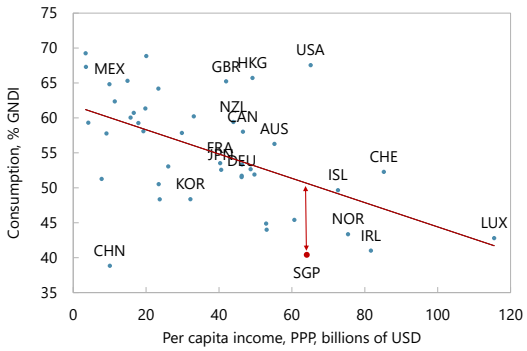
Figure 7. Singapore: Consumption Share, Relative to Peer Average
(Average consumption in % of GNDI, 2019)



Source: IMF staff estimates
Note: Based on an estimated relationship between consumption rates and its major determinants among AEs, 1980-2019, as shown in the Annex Table 1.1, column () in the Annex 1; The colored bars show the contribution of each category: Income uncertainty=forecast uncertainty of real GDP growth pc; Demographics=old aged dependency ratio & aging speed; the share of labor compensation in GDP; Real GDP per capita in PPP international currency in logs; Credit = credit-to-GDP & real deposit rates.

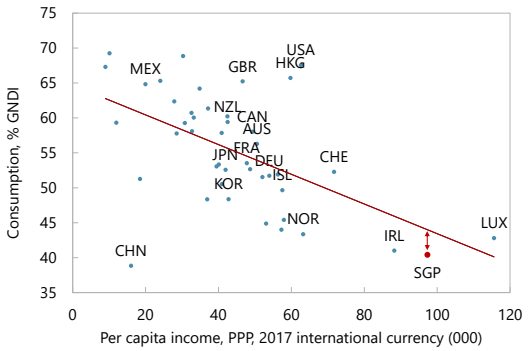
- Economies with higher income tend to have a lower consumption rate. Singapore's per capita income is among the highest in the world, both in nominal terms and, especially, in purchasing power parity (PPP) terms (Figures 8 and 9). Such high income with more purchasing power contributes to the low consumption-to-GNDI share.

Figure 8. Nominal per Capita Income and Consumption Share, 2019
(Percent of GNDI on the y-axis; income per capita, USD, in billions on the x-axis)



Sources: United Nations, IMF staff calculations

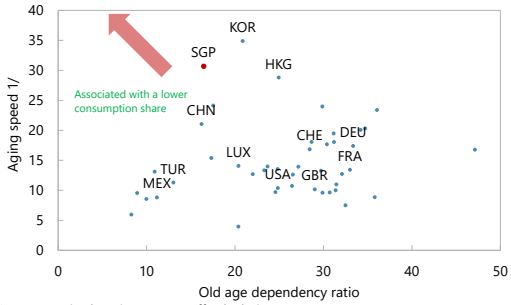
Figure 9. Per Capita Income in PPP and Consumption Share, 2019
(Percent of GNDI on the y-axis; income per capita, PPP, in thousands on the x-axis)



Sources: United Nations, IMF staff calculations

- Singapore's population is young but aging fast (Figure 10). The current level of old age dependency (OAD) ratio is relatively low, meaning that a large share of the population is young and in their prime age for saving. Additionally, Singapore's aging speed, proxied by the projected changes in the OAD ratio in 20 years, is among the fastest, indicating a more urgent need to save for old-age consumption. Both demographic factors lead to a lower consumption rate.

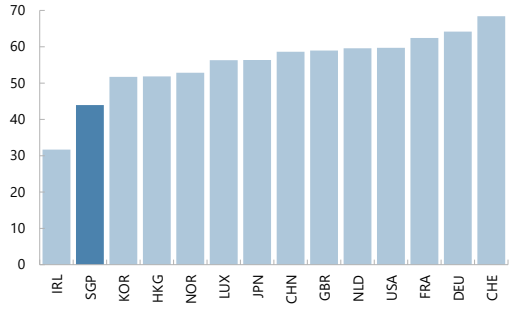
Figure 10. Age Distribution and Aging Speed
(Percent of working age population)



Sources: United Nations, IMF staff calculations
1/ Projected changes in old age dependency ratio in 20 years

- Singapore's labor share in income is among the lowest in the world (Figure 11). Singapore has a large corporate sector, with significant presence of foreign enterprises.[5] This implies that a relatively small amount of resources compared to national income would ultimately remain available for household consumption. The consumption rate, as a share of national income, thus likely underestimates Singaporean households' propensity to consume.

Figure 11. Labor Compensation, 2019
(Percent of GDP)



Source: Penn World Table 10.0

[5] Total corporate sector assets amounted to 1,828 percent of GDP in 2019, and the share of foreign enterprises is about 63 percent in terms of total value added in 2019.

- Higher income uncertainty in Singapore, measured by the forecast error of real per capita GDP growth, also contributes modestly to the lower consumption rate. However, the income uncertainty measure at the aggregate level used in this analysis likely captures a limited aspect of uncertainties that households face. Incorporating alternative uncertainty measures, directly related to current and future household disposable income, could help further identity drivers for precautionary motives.

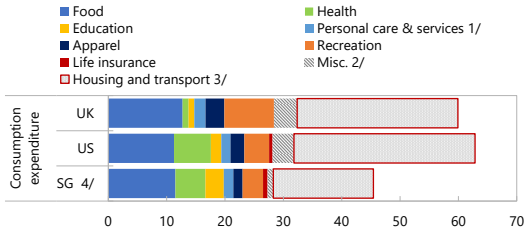
Other social factors could also affect consumption, such as strong bequest motives, although this factor is difficult to quantify.

10. The structural factors that normally drive higher saving rates in Singapore can help alleviate consumption compression during crises. A cross-economy regression analysis can help uncover how economic crises interact with the structural drivers of consumption. First, the negative relationship between the consumption share and income level is more muted during a crisis, indicating that consumption compression could be smaller for a high-income economy like Singapore (Annex Table 1.2). Regarding demographics, saving for the current old age population and the dynamic effect of a fast-aging population on today's saving work differently for Singapore: (i) on the one hand, for its young population with a low OAD ratio, consumption compression during a crisis would be greater compared to an economy with an older population; and (ii) on the other hand, being a fast-aging population means that the consumption compression could be smaller, as saving motives for retirement and old age consumption for the future would become less salient during a crisis. For Singapore, the effect of fast-aging population outweighs the effect of a low OAD. This indicates that its demographic characteristics and related saving, as well as its high-income level, can help mitigate consumption compression during a crisis in Singapore.

11. A granular look at the expenditure distribution using household surveys could help further identify the drivers of relatively low consumption in Singapore. Comparing where and by how much an average household spends its income can offer useful insights into the drivers of consumption patterns, insights that could be difficult to identify with only macroeconomic data. In order to identify the sources of differences, we compare the consumption expenditure distribution of Singaporean households to those of countries among the highest consumption-to-GNDI ratios among AEs, namely the U.S. and the U.K (Annex 2).

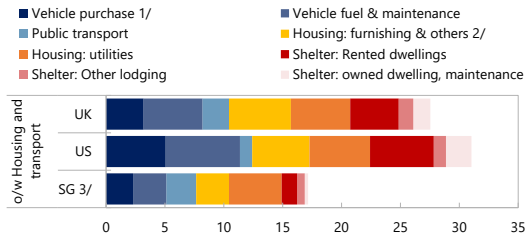
12. Singapore's low housing and transport costs may further explain the gap unexplained by the macro-level analysis. Household survey statistics confirm that Singapore's consumption expenditure, as a share of gross household income, is relatively low, compared to the other two economies (Figure 12). When comparing spending items in detail, however, the overall consumption expenditure share on most non-durable and service items (food, health, education, personal care, apparel, and recreation) is similar in all three economies (note the colored portion on the LHS chart). The difference in the consumption level between Singapore and the two other economies is mostly led by expenditures related to transport and housing (Figure 13)

Figure 12. Consumption Expenditure, 2018
(Percent of gross household income; Average over all households)



Sources: Singapore HES 2017/18; U.S. CEX 2018; U.K. LCF 2018; IMF staff calculations
1/ Sum of personal care and household personal/household services (e.g., child/elderly care)
2/ Misc. in US-CEX include cash contributions to oustide the household, e.g., alimony & child care support, and religious, charitable & political contributions.
3/ Not including the imputed rental for owned dwellings for SG and the mortgage payments & taxes on the owned dwellings for US
4/ SGP-total, based on income excluding employer CPF contributions

Figure 13. Housing and Transport Expenditure, 2018
(Percent of gross income; Total: average across all households)



Sources: Singapore HES 2017/18; U.S. CEX 2018; U.K. LCF 2018; IMF staff calculations
Note: Not including imputed rental or mortgage payments & taxes for owned dwellings
1/ Including Certificate of Entitlement (COE) for car purchases in SG
2/ Including furnishing, household equipment, housekeeping supplies, goods and services for routine household maintenance & other household expenses
3/ SG, based on income excluding employer CPF contributions

- Singaporean households tend to spend significantly less on transportation. Their spending on owned vehicles (purchase and maintenance) is about half or less that in the other two economies, and this difference more than offsets Singaporeans' higher spending on public transportation. This relates to Singapore's transportation policy: it requires a license (certificate of entitlement) when purchasing a car, leading to a low car ownership. By the same token, Singapore maintains high-quality public transportation infrastructure widely available, which makes public transportation more affordable.
- Singaporean households' housing- and shelter-related consumption expenditure is also about half the level in the other two economies. Expenditure on rented housing is especially low on average. This reflects Singapore's housing policy that makes public housing widely available at a relatively affordable price, reducing the need for rentals. The rate of homeownership is very high at 90 percent in 2019, with over 80 percent of Singapore Residents living in public housing.

C. Concluding Remarks

13. COVID-19 has triggered unprecedented shocks to consumption in Singapore notwithstanding significant policy support. Consumption contracted by 14 percent, y/y, in 2020 despite sizable fiscal support, due to mobility and other virus containment-related restrictions and heightened uncertainties. The recovery of consumption going forward is likely to be gradual as pandemic-related uncertainties and lingering health risks continue to weigh on consumer sentiment. However, measures to support consumption, such as income subsidies or cash grants, may still deliver higher consumption as restrictions are eased and households feel more secure about future income prospects. Continued support for job creation in the recovery phase and a robust labor market overall will also help the recovery in the near term and boost consumption over the medium- to long-term.

14. The pandemic has also changed consumption behavior, including through increased online shopping and e-commerce. While e-commerce has been accelerating in recent years especially amid the pandemic, e-commerce in Singapore remains below the level in most peer economies (See Chapter 3: The Digital Economy: A Potential New Engine for Productivity Growth). There is a sizeable scope to expand digital commerce, supported by a conducive digital environment. Further digitalization and expansion of e-commerce could create new demand beyond substitution from offline to online, thus boosting the consumption level over the medium-term (Kinda, 2019).

Annex I. Singapore: Identifying Structural Drivers of Consumption

1. **The analysis quantifies the contribution of structural drivers of consumption to Singapore's consumption share using a regression model.** The relationship between consumption and its important drivers is estimated, using a sample of 41 advanced economies, including Singapore for the period of 1980-2019:

$$c_{i,t} = \beta^1 Uncertainty_{i,t} + \beta^2 Demographic_{i,t} + \sigma\, Labor\ Share_{i,t} + Controls_{i,t} + \delta_i + \theta_t + \epsilon_{i,t}$$

where $c_{i,t}$ denotes consumption in percent of GNDI of an economy i and year t; $Uncertainty_{i,t}$ denotes a measure of income uncertainties (income growth volatility measured by the instantaneous forecast error of per capita real GDP growth estimated using the time-varying standard deviation of a first-order GARCH model, a la Mody et al., 2012); $Demographic_{i,t}$ includes the current old-age dependency ratio (ratio of population with age over 64, over the working age population) and a measure of aging speed proxied by the projected increase of the old-age dependency ratio in the next 20 years; $Labor\ Share_{i,t}$ denotes the share of labor compensation in GDP. It controls for year- and economy-fixed effects to absorb common economic cycles and economy-specific characteristics. Additional control variables (e.g., income level and growth, private sector credit and real deposit rates) were considered to check robustness.

Annex Table 1.1. Singapore: Structural Drivers of Consumption

Dependent Var. :	Year and country-fixed effects					
Consumption (% GNDI)	(1)	(2)	(3)	(4)	(5)	(6)
Income uncertainty	-0.0662*			-0.0372	-0.0894**	-0.142***
	(0.0309)			(0.0276)	(0.0288)	(0.0351)
Population growth		-0.410**		-1.362***	-1.300***	-1.353***
		(0.157)		(0.153)	(0.151)	(0.162)
Old-age dependency ratio		0.211***		0.139***	0.113**	0.0807*
		(0.0385)		(0.0363)	(0.0360)	(0.0386)
Aging speed		-0.238***		-0.0874**	-0.0697*	-0.0897**
		(0.0320)		(0.0275)	(0.0279)	(0.0289)
Labor share			0.347***	0.388***	0.372***	0.331***
			(0.0288)	(0.0267)	(0.0269)	(0.0307)
Per capita income, PPP, lagged in log					-2.831***	-4.595***
					(0.566)	(0.659)
Growth					-0.141***	-0.203***
					(0.0289)	(0.0348)
Private sector credit						0.0170***
						(0.00332)
Real deposit rate						-0.0166
						(0.0239)
N. Obs.	1302	1815	1821	1282	1282	909
R-sq.	0.128	0.117	0.128	0.315	0.330	0.393

Note: Estimates are obtained using a sample of 41 advanced economies, including Singapore, over the period 1980-2019; *** p<0.01, ** p<0.05, * p<0.1; Constant term, year and economy fixed effects are not reported for brevity

2. **To shed light on how the structural drivers interact with economic crises, the regression analysis is augmented by including a dummy variable to capture crises.** The dummy variable is constructed to take the value one for years in which the economy's real GDP growth falls more than one standard deviation below its historical average. As shown in the column (2) in the table below, the crisis dummy alone is not significant, likely because during crises income (in the denominator) declines as well as consumption (in the numerator). When interacted with other structural drivers of consumption, however, the coefficients on the crisis dummy as well as its interaction terms with demographic variables and income level are significant (column (4)-(7)), indicating that consumption rates on average may be lower (i.e., consumption may get compressed) during a crisis, but the magnitude of consumption compression depends on the economies' characteristics such as income level and demographics.

Annex Table 1.2. Singapore: Structural Drivers of Consumption, Interacted with Crisis Dummies

Dependent Var.:	Country fixed effects						
Consumption (% GNDI)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Income uncertainty	-0.0784**	-0.122***	-0.111**	-0.107**	-0.111**	-0.108**	-0.106**
	(0.0275)	(0.0314)	(0.0342)	(0.0340)	(0.0341)	(0.0340)	(0.0342)
Population growth	-1.252***	-1.278***	-1.266***	-1.222***	-1.261***	-1.225***	-1.275***
	(0.155)	(0.160)	(0.161)	(0.161)	(0.160)	(0.160)	(0.160)
Old-age dependency ratio (OAD)	0.0874***	0.0770**	0.0755**	0.0715**	0.0749**	0.0716**	0.0760**
	(0.0262)	(0.0269)	(0.0269)	(0.0268)	(0.0268)	(0.0268)	(0.0269)
Aging speed	-0.0561*	-0.0832**	-0.0835**	-0.0835**	-0.0928***	-0.0910***	-0.0847***
	(0.0240)	(0.0256)	(0.0256)	(0.0255)	(0.0257)	(0.0257)	(0.0255)
Labor share	0.321***	0.298***	0.299***	0.296***	0.300***	0.297***	0.295***
	(0.0276)	(0.0301)	(0.0301)	(0.0300)	(0.0300)	(0.0299)	(0.0301)
Per capita income, PPP, lagged in log	-1.982***	-4.123***	-4.121***	-4.174***	-4.183***	-4.216***	-4.197***
	(0.519)	(0.606)	(0.606)	(0.604)	(0.605)	(0.603)	(0.606)
Growth	-0.135***	-0.203***	-0.220***	-0.241***	-0.226***	-0.243***	-0.228***
	(0.0269)	(0.0294)	(0.0366)	(0.0371)	(0.0365)	(0.0370)	(0.0367)
Private sector credit		0.0235***	0.0235***	0.0230***	0.0234***	0.0230***	0.0234***
		(0.00298)	(0.00298)	(0.00297)	(0.00297)	(0.00297)	(0.00298)
Real deposit rate		-0.000470	-0.00112	-0.00148	-0.00403	-0.00377	-0.000652
		(0.0241)	(0.0242)	(0.0240)	(0.0241)	(0.0240)	(0.0241)
Crisis1/			-0.249	-2.310**	-1.181*	-2.767***	-10.37*
			(0.304)	(0.749)	(0.463)	(0.779)	(4.704)
Crisis X OAD				0.0932**		0.0799*	
				(0.0310)		(0.0316)	
Crisis X Aging speed					0.0803**	0.0648*	
					(0.0302)	(0.0307)	
Crisis X Income level							0.954*
							(0.443)
N. Obs.	1262	894	894	894	894	894	894
R-sq.	0.220	0.322	0.323	0.330	0.328	0.333	0.326

Note: Estimates are obtained using a sample of 41 advanced economies, including Singapore, over the period 1980-2019; *** p<0.01, ** p<0.05, * p<0.1; Constant terms and economy-fixed effects are not reported for brevity; 1/ Crisis is a dummy variable which take value one for years in which real GDP growth fell more than one standard deviation below the economy's historical average growth rate.

Annex II. Singapore: Consumption Expenditure Distribution, Based on Household Expenditure Surveys

1. **Singapore Household Expenditure Survey (SG-HES) collects information about the latest consumption expenditure of resident households (Singapore Department of Statistics, SingStat).** It provides detailed data on the distribution of household consumption expenditure, along with households' demographic and socio-economic characteristics. The survey is conducted every 5 years, with the latest one in 2017/18. While the underlying household-level survey data are not publicly available, SingStat publishes key indicators including the distribution of average household consumption expenditure.

2. **We compare the SG-HES key indicators to the corresponding indicators from the U.S. Consumption Expenditure Survey (US-CEX) and the U.K. Living Costs and Food Survey (UK-LCF).** The US-CEX is a nationwide household survey conducted by the U.S. Bureau of Labor Statistics (BLS), and the BLS publishes summary tables that show breakdown of consumption expenditure by household characteristics similar to the SG-HES. The UK-LCF is the most significant survey on household spending in the U.K, collecting information on spending patterns and cost of living. The results from 2018 were used for both surveys for comparison purposes.

3. **The surveys are broadly consistent in terms of their concepts of income and expenditure, as well as the categorization of consumption items, but some differences are worth noting.** The surveys consider gross income—including income from employment and businesses as well as from other sources such as investment, pension and government transfers—before personal taxes.

- The concept of income in the US-CEX and UK-LCF does not include employers' contribution to employees' savings or social securities. For comparability, for the SG-HES, we thus use the measure of income excluding employer CPF contributions where possible.
- Expenditure in the US-CEX includes employee contributions to pensions and social security, while the SG-HEX expenditure does not include households' contribution to Central Provident Fund (Singapore's national saving and pension plan); UK-LCF also excludes contributions to pension funds. For better comparability, we separated out the pensions and social security from the US-CEX consumption expenditure.
- Consumption expenditure in the SG-HES does not include loan payments including mortgage interest. The US-CEX, however, includes mortgage interest and charges as well as property taxes as part of the shelter cost of owned dwellings; UK-LCF includes mortgage interest payments, council tax etc. in 'other expenditure items.' For better comparability, we separate out the mortgage- and property tax- related payments on owned dwellings from the US-CEX's and UK-LCF consumption expenditure.
- Annex Tables 2.1 & 2.2 provide a comparison of corresponding concepts of income and expenditure items in detail between different surveys.

Annex Table 2.1. Singapore: Household Expenditure Survey: Concept of Income and Expenditure

Category	SG-HES, 2017/18	US-CEX, 2018	UK-LCF, 2018
Income	Income from all sources, recurrent and regular income from employment, business, as well as income from investment, rental and other sources such as cash contribution from relatives/friends, pension and regular government transfers. *Not included:* irregular receipts or one-off payments, e.g., from sale of properties, capital gains from trading of stocks and shares, windfalls, non-recurring insurance payouts, and lump sum CPF withdrawals.	Money income before taxes, including wages and salaries; self-employment income; social security, private & government retirement; interests, dividends, rental income, and other property income; unemployment and workers' compensation and veterans' benefits; public assistance, supplemental security income, and food stamps; regular contributions for support, and other income (e.g., income from care of foster children, cash scholarships, fellowships, or non-work based stipends). *Not included:* net changes in assets, including sales/purchase securities, own dwelling, properties; other lump-sum payments and refunds from estate or trust, insurance.	Receipts (either monetary or in kind) that are received on a regular basis and are available for current consumption.
Expenditure	Value of consumer goods and services acquired, used or paid for by a household for the satisfaction of the needs and wants of its members. *Not included:* non-consumption expenditure such as loan repayments, income taxes, purchase of house	Transaction costs of goods and services acquired by a household during the recordkeeping period, including expenditure for gifts *Not included:* purchases directly assignable to business purposes; periodic or installment payments on goods and services already acquired; Mortgage principal paid on owned property	Total expenditure represents current expenditure on goods and services. *Not included:* those recorded payments that are really savings or investments: for example, purchases of national savings certificates, life assurance premiums, and contributions to pension funds. Similarly, income tax payments, national insurance contributions, mortgage capital repayments and other payments for major additions to dwellings are excluded.

Annex Table 2.2. Singapore: Household Expenditure Survey: Matching Consumption Expenditure

Category	Sub-category	SG-HES, 2017/18	US-CEX, 2018	UK-LCF, 2018
Food	Food at home	Food and non-alcoholic beverages	Food at home	Food and non-alcoholic drinks
	Food away from home	Food serving services	Food away from home	Catering services
	Alcohol & tobacco	Alcoholic beverages and tobacco	Alcoholic beverage	Alcoholic drink, tobacco and narcotics
			Tobacco products and smoking supplies	
Apparel		Clothing and footwear	Apparel and services	Clothing and footwear
		Misc. goods & services: Other personal effects		Personal effects
Health	Health products	Medical products, appliances and equipment	Drugs	Medical products, appliances and equipment
			Medical supplies	
	Health services	Outpatient services	Medical services	Hospital services
		Hospital, convalescent and rehabilitation services		
	Health insurance	Misc. goods & services: Insurance connected with health	Health insurance	Medical insurance premiums
Transport	Vehicle purchase	Purchase of vehicles	Vehicle purchases	Purchase of vehicles
	Maintenance	Operation of personal transport equipment	Gasoline, other fuels, and motor oil	Operation of personal transport
		Misc. goods & services: Insurance connected with transport	Other vehicle expenses (incl. insurance)	Vehicle insurance including boat insurance
	Public transport	Land transport services	Public and other transportation	Transport services
		Other transport services		
Recreation		Recreation and culture	Entertainment	Recreation and culture
			Reading	
Education		Education services	Education	Education
Personal care		Misc. goods & services: Personal care	Personal care products and services	Personal care
Household personal services		Misc. goods & services: Social services	Household operations: personal services	Social protection
Housing	Shelter: owned-dwelling	Maintenance and repair of dwelling	Maintenance, repairs, insurance, other expenses	Maintenance and repair of dwelling
		Insurance connected with dwelling		Household insurances - structural, contents and appliances
	Shelter: rented-dwellings	Rentals for housing	Rented dwellings	Actual rentals for housing
	Shelter: other lodging	Accommodation services	Other lodging	Accommodation services
	Utilities	Utilities and other fuels	Utilities, fuels, and public services	Water supply and miscellaneous services relating to the dwelling
		Telecommunication services		Electricity, gas and other fuels
				Telephone and telefax services
	Furnishing, equipment, other expenses	Furnishing, household equipment and routine household maintenance	Household operations: other household expenses	Household goods and services
		Telecommunication equipment	Household furnishing equipment	
		Postal and courier deliver services	Housekeeping supplies	Telephone and telefax equipment; Postal services; Internet subscription fees
Life and other insurance		Misc. goods & services: Life insurance	Life and other personal insurance	
		Misc. goods & services: Other insurance		
Misc.			Miscellaneous	Misc. goods & services: Other services
		Misc. goods & services: Other financial services		
		Misc: goods & services: other services	Cash contributions	Licences, fines and transfers
		Miscellaneous goods and services N.E.C		Holiday spending
		Non-assignable expenditure		Money transfers and credit

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LABOR MARKET POLICY RESPONSE TO THE COVID-19 CRISIS[1]

The COVID-19 health crisis has adversely impacted businesses and led to a deterioration in labor market conditions, including through higher unemployment. In addressing the crisis, the Government has deployed multiple programs, which at the beginning of the pandemic concentrated on preserving jobs and, in later stages, moved to support employment generation and upskilling of workers. The programs have been largely tilted towards low-income residents, especially those who lost their job or income during the pandemic and have resulted in an increase in employment among resident workers.

A. Impact of COVID-19 on the Labor Market

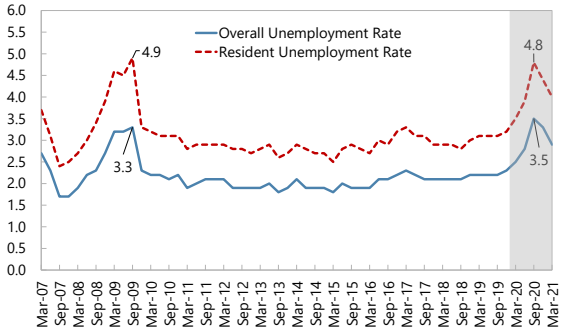
1. Singapore labor market is characterized by low unemployment, a high share of non-resident workers, and reliance on active labor market policies. Before the pandemic, the overall unemployment rate was stable and low for many years, at a little above 2 percent. Foreign labor and skills help Singapore's growth to be unconstrained by the small population, fill the skills gap, and maintain competitiveness by relieving wage pressures (IMF, 2019).[2] The government sets industry-specific ceilings on the foreign worker dependency ratio and imposes a foreign worker levy on some pass types to keep the reliance on foreign workers in check. Non-residents represented 29.3 percent of total employment (excluding migrant domestic workers) in December 2020. Singapore relies on active labor market policies such as on-the-job training and employment subsidies to support employment and help workers reskill and adapt to a changing job market. All employers pay a levy for all their employees, which is then channeled through the Skills Development Fund to finance skills upgrading of the workforce.

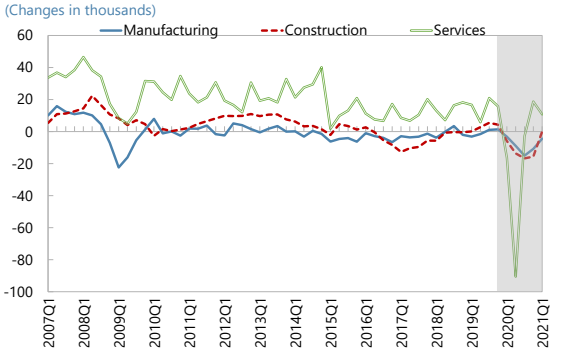
2. Unemployment increased significantly during the pandemic. The overall rate of unemployment peaked at 3.5 percent in September 2020, surpassing the level observed during the global financial crisis. Manufacturing and construction suffered employment losses throughout 2020, whereas the services sector registered employment gains in the last quarter of the year. Overall, the manufacturing sector lost 37,800 workers in 2020, whereas construction and services lost 51,800 and 91,100 workers respectively.

3. Non-resident workers have borne the brunt of pandemic-related job losses. The employment gap between residents and non-residents widened as the labor market policy support provided by the Government mainly targeted residents. Non-residents faced a higher retrenchment rate (1.6 percent of non-resident employees were retrenched in 2020 compared to 1.1 percent for residents). In addition, the government's incentives to support new job creation applied only to residents. As a result, non-resident employment, as a percent of total employment (excluding migrant domestic workers), declined to 29.3 percent in December 2020 from 33.1 percent in December 2019.

[1] Prepared by Abdul Mannan (APD).

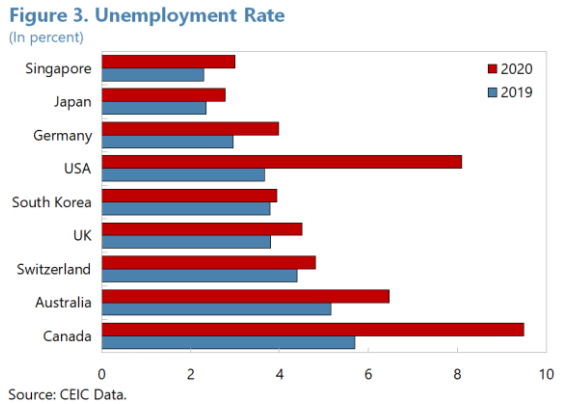
[2] Singapore: 2019 Article IV Consultation, Appendix VIII: "Labor Market Policies".

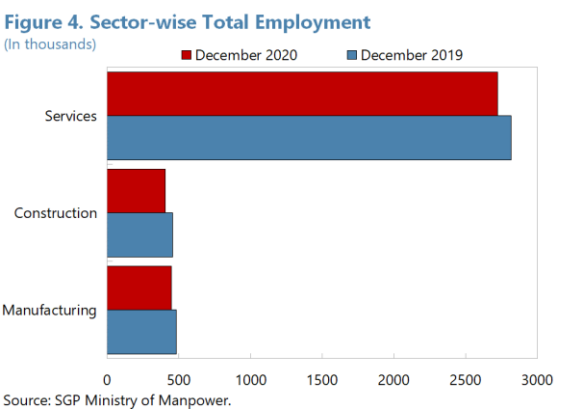




4. The self-employed have also been severely impacted by the pandemic. These include taxi and private hire car drivers, freelancers, vendors, and direct sellers who have been significantly affected by the protracted impact of the pandemic, as restrictions on movement, and safe distancing measures have significantly impacted these activities.

5. However, Singapore's labor market outcomes during the crisis fare relatively well from a cross-country perspective. Compared to peers, Singapore entered the pandemic with low unemployment and the increase in unemployment during the pandemic remains relatively low. Singapore's average annual unemployment rate in 2020 was 3.0 percent, one of the lowest rates among advanced economies. However, employment in the construction sector declined by 11.3 percent in 2020, compared to 7.8 percent and 3.2 percent in manufacturing and services respectively. The significant decline in total employment was driven by the non-resident workers' employment loss (13.7 percent in 2020), which cushioned the impact on the resident labor market and overall unemployment rate.





B. Short Term Labor Market Measures to Address the COVID-19 Crisis

6. Singapore supports workers through active labor market policies.[3] Workforce Singapore and the National Trade Unions Congress's Employment and Employability Institute provide support

[3] Appendix VIII of the 2019 Article IV report includes a summary of pre-COVID labor market policies in Singapore.

to help jobseekers overcome job search barriers and access opportunities. For example, Career Conversion Programs equip jobseekers with new skills to help them move into new occupations or sectors that have good prospects and opportunities for progression. Individuals facing more difficulties to be placed can receive stronger support through individualized career coaching. The Workfare Income Supplement (WIS) scheme has provided both cash grants and top-ups to retirement savings to support low-income workers (the bottom 20 income percentile, with some support for those slightly above). In addition, Progressive Wage Models, with a schedule of wage floors for specific sectors (cleaning, security, and landscape) have helped protect wages in these sectors.

7. The government has bolstered labor market policies with a comprehensive set of measures to cushion the immediate impact of the pandemic. To secure job retention and support wage increases, the Government has provided wage subsidies under the enhanced Jobs Support Scheme (JSS) and enhanced Wage Credit Scheme (WCS). The workers who lost their job or income were initially supported through the Temporary Relief Fund and later through the COVID-19 Support Grant (CSG). and COVID-19 Recovery Grant (CRG). In addition, there have been provisions of Workfare Special Payment support for low-income households and assistance through the Courage Fund for lower-income households impacted by COVID-19. The Self-employed Person Income Relief Scheme (SIRS) and Training Support Scheme have provided support to self-employed persons whose incomes have been affected by the pandemic.

8. The Jobs Support Scheme (JSS) is the largest labor market measure, designed to support income. The Unity Budget in February 2020 provided wage support for employers to retain their resident employees under the JSS. With a total budget of S$30 bn (6.3 percent of GDP) in FY2020 and FY2021, the JSS is the largest labor market measure. It covers all active employers, except for government organizations and representative offices. Under the JSS, the Government initially co-funded between 25 and 75 percent of the first S$4,600 of gross monthly wages paid to each local employee in a 11-month period (up to August 2020). The support was then reduced to 0-50 percent of the first S$4,600 of gross monthly wages in the subsequent 7-month period (September 2020 to March 2021), when the economy gradually reopened. The level and duration of support each employer received varied by sector, with highly impacted sectors receiving greater support. Firms were divided into three different tiers: Tier 1 (aviation, aerospace, and tourism and others), Tier 2 (retail, arts and culture, food services, built environment and others), and Tier 3 (biomedical sciences, precision engineering, electronics, financial services, information and communications technology, media, postal and courier, online retail, and supermarkets and convenience stores, and others). The 2021 budget extended the JSS by up to 6 months from Apr 2021 to Sep 2021 with co-funding further reduced (in response to the improved economic environment) to 10-30 percent for all firms. Tier 3 firms, which are considered to have managed the crisis well, are not covered under the extended JSS from either June or September 2021.

Table 1. Singapore: How the Support Programs Have Been Designed to Fulfill Different Objectives While Supporting Various Groups of People

Support to	Support for	Program and Duration	Summary Description
Employer	Wage Increase	**Wage Credit Scheme (WCS)** (2019, 2020, and 2021)	Over S$2 billion in wage credits disbursed to employers during the pandemic of which over $1 billion was disbursed in 2020 to more than 95,000 employers.
	Job Retention	**Jobs Support Scheme (JSS)** (Oct. 2019 to Sept. 2021)	A budget of S$30 bn has been allocated, of which S$26.9 bn in FY20. More than 140,000 firms employing more than 2 million local workers have benefited from the JSS.
	Employers' adjustment of operations to COVID requirements	**Foreign Worker Levy (FWL) rebates and waivers** (April 2020 to Dec 2021)	Received S$2.3 bn budget in FY20. More than 62,000 firms (including 15,000 firms in the Construction, Marine Shipyard and Process sectors) benefited.
Employee	Support in case of job/income loss	**COVID-19 Support Grant** (May 2020 to Dec 2020)	Received S$0.2 bn in FY20. More than 98,000 workers benefited from it.
Self - employed	Additional Support for Self-employed	**SEP Income Relief Scheme (SIRS)** (April 2020 to Dec 2020)	Received S$2.0 bn budget in FY20. More than 200,000 self-employed people benefited.
		SEP Training Support Scheme (April 2020 to Mar 2021)	The National Trades Union Congress (NTUC) run this training program and the Government allocated S$84 million to it.
Both Employee and Self-employed	Support in case of job/income loss	**Temporary Relief Fund** (April 2020)	With a budget of S$0.2 bn, this program served about 450,000 people.
	Support in case of job/income loss	**COVID-19 Recovery Grant (CRG)** (Jan to Dec 2021)	The grant has been open for applications since January 18, 2021, and about 10,500 applications had been approved as of March 22, 2021.
	Support to low income people	**Enhanced Workfare Special Payment** (2020 and 2021)	Eligible low-income workers and self-employed persons have been receiving S$3,000 each.
	Support in case of COVID-19 Contraction	**Courage Fund** (Started at April 2020, end date not declared)	The fund has been supporting families of healthcare workers, frontline workers, community volunteers, and other workers who have contracted Covid-19.
New Employment	Salaries for new hires co-paid	**Incentives for new hiring** (April-Aug 2020)	Maximum 40 percent of salary would be co-paid for eligible new hires. This was replaced by the Jobs Growth Incentive program.
		Jobs Growth Incentive (JGI) (Sept 2020 to Sept 2021)	JGI benefitted about 130,000 new local hires in its first three months of implementation (Sep - Nov 2020).
	Jobs, traineeships, attachments and skills trainings	**SGUnited Jobs and Skills Package** (May 2020 to Mar 2022)	Nearly 93,000 applicants have been placed in jobs and skills opportunities as of end-Feb 2021. In 2021, funds have been set aside to provide 35,000 additional opportunities.

9. In response to recent increases in community infections and a move to Phase 2 (Heightened Alert) until June 13, 2021, the government increased JSS support between May 16, 2021 and June 13, 2021 for some sectors affected by the tightened social distancing measures. During this period, support for food and beverage, performing arts, and arts education sectors was raised from 10 to 50 percent. Support for gyms, fitness studios and other sports facilities was raised from zero to 50 percent; support for indoor playgrounds and other family entertainment centers, and affected personal care services was raised from zero to 30 percent; and support for retail, cinema operators, and museums, art galleries and historical sites was increased from 10 to 30 percent.

Table 2. Singapore: Jobs Support Scheme (JSS) Schedule and Payout Ratio

Month of Payout	Payout for wages paid in	Tier 1 (Aviation, aerospace, tourism)	Tier 2 (Food, Retail, and Entertainment)	Tier 3A (Other Sectors)	Tier 3B (Sectors that are managing well such as biomedical science, ICT)
Apr. 2020	Oct.-Dec. 2019	75%	50%	25%	25%
Jul. 2020	Feb.-Apr. 2020	75%	50%	25%	25%
Oct. 2020	May-Aug. 2020	75%	50%	25%	25%
Mar 2021	Sep.-Dec. 2020	50%	30%	10%	10%
Jun 2021	Jan.-Mar. 2021	50%	30%	10%	0%
Sep. 2021	Apr.-Jun. 2021	30%	10%*	0%**	0%**
Dec. 2021	Jul.-Sep. 2021	10%	0%	0%	0%
Actual JSS payout (in S$ bn) to the tiers (up to December 2020):		2	5	16	

Notes: a) Tier 1 includes the most affected industries such as Aviation and Aerospace, Tourism, Hospitality, Conventions and Exhibitions; Tier 2 includes Food Services, Retail, Arts and Entertainment, Land Transport, Marine and Offshore; Tier 3 includes others; b) The Built Environment sector was considered Tier 1 only for June-Oct. 2020 wages; thereafter it qualified for Tier 2 wage support; c) Tier 3B includes Biomedical Sciences, Precision Engineering, Electronics, Financial Services, Information and Communications Technology (ICT) and Media, Tier 3A includes others.
* During 16 May 2021 to 13 June 2021, increased support ratios are applicable at 50 percent for food and beverage, and performing arts and arts education, and 30 percent for retail, cinema operators, and museums, art galleries and historical sites.
** During 16 May 2021 to 13 June 2021, increased support ratios are applicable at 50 percent for gyms, fitness studios and other sports facilities, and 30 percent for indoor playgrounds and other family entertainment centers and affected personal care services.

10. The JSS has had a strong take up and helped achieve significant job retention for residents. The beneficiary firms have been able to retain workers and offer new openings. The authorities estimate that the fiscal policy support measures, among which JSS is the largest single measure, have prevented the resident unemployment rate from rising by 1.7 percentage points in 2020 and have helped save or create about 155,000 jobs during 2020–2021 (up to January 2021).[4] Thanks to the support provided to Tier 1 and 2 firms under the JSS, these firms accounted for 22 percent of overall job losses during April-July 2020, compared to 42 percent during January-March 2020.

[4] See" An Interim Assessment of the Impact of Key COVID-19 Budget Measures" published in February 2021 by Ministry of Finance, Singapore, available at: https://www.mof.gov.sg/docs/default-source/default-document-library/news-and-publications/featured-reports/interim-assessment---covid-19-budget-measures-(final).pdf, page 11.

11. The Wage Credit Scheme (WCS) has been enhanced to help support workers' job retention and income growth. In response to the pandemic, the Government's share in co-funding for the Wage Credit Scheme for 2019 and 2020 has been raised to 20 percent and 15 percent from the earlier declared 15 percent and 10 percent, respectively. In addition, the FY2021 budget extended the scheme up to 2021 with a co-funding rate of 15 percent. The qualifying gross wage ceiling has also been raised from S$4000 to S$5000 for this period (2019-2021). Both the Wage Credit Scheme and the Jobs Support Scheme have helped preserve employment relationships, which should allow growth opportunities to be captured when the pandemic eases.

12. The COVID-19 Support Grant (CSG) and COVID-19 Recovery Grant (CRG) have been introduced to provide support in case of job/income loss. Under the CSG, residents were supported in case of job or income loss during May-December 2020. Eligible applicants, 16 years or older, would be provided up to S$800 per month for three months in case of job loss or involuntary no-pay leave for three consecutive months, and up to S$500 per month for three months in case of salary loss of at least 30 percent for three consecutive months. As of end-2020, around S$215 million were disbursed to around 98,000 people under the CSG program. Upon expiry of the CSG at end-2020, the COVID-19 Recovery Grant (CRG) was introduced starting in January 2021. Under this new program the applicant age floor has been raised to 21 years and the eligibility list has been extended to self-employed persons. However, support payment for job loss has been reduced to S$700 per month under this new program and a condition was added that the applicants must have actively participated in job search and training efforts. A new Covid-19 Recovery Grant (Temporary) payout was added between May 16, 2021 and June 30, 2021: up to S$700 in case of involuntary no pay leave for a month and up to S$500 in case of 50 percent or more income loss for a month.

13. A waiver of the Foreign Workers Levy (FWL) and additional rebate payment have supported employers' adjustment of operations in a COVID-19 environment. This included helping employers fulfill their obligations towards their foreign workers, including paying for their salaries and caring for their upkeep during the Circuit Breaker.[5] This also helped employers adapt to Government-required Safe Management Measures. The waiver was initially extended for two months for the businesses who still could not resume operations, and subsequently till December 2021 for employers in construction, marine shipyard and process sectors. The amount of support was gradually reduced, in line with the improvement in the economy.

[5] Singapore implemented a nationwide partial lockdown known as a Circuit Breaker from April 7 to June 1, 2020, to contain the spread of COVID-19. This included closures of all non-essential workplaces, compulsory mask wearing, movement restrictions, testing, and health monitoring.

Table 3. Singapore: FWL Waiver and Rebate Payments		
Payment due in	Rate of Waiver	Rebate Amount per worker*
June 2020	100%	S$750
July 2020	100%	S$375
August 2020	100%	S$375
September 2020	100%	S$375
October 2020	75%	S$90
November 2020	50%	S$90
December 2020	25%	S$90
January-April 2021	0%**	S$90
May-September 2021	0%**	S$250
October-December 2021	0%	S$250
*Workers include S Pass holders (mid-level skilled staff earning at least S$2,500 a month) and Work Permit Holders (semi-skilled foreign workers) ** However, 100% waiver of FWL is applicable for the period during which workers are under Stay-Home Notice (SHN)		

C. Recovery Measures

14. The SGUnited Jobs and Skills (SGUJS) package was introduced in May 2020 to curate close to 100,000 jobs and skills opportunities, of which more than 40,000 were to be jobs, and the remaining being company-hosted traineeships and attachments as well as training opportunities. Schemes under the SGUJS package provided support for locals to enter new jobs or take up meaningful skills upgrade opportunities that will boost their employability and position them better for the economic recovery. As of end-December 2020, there were nearly 76,000 placements into SGUJS opportunities, of which close to 80 percent (59,400) were placed into jobs, exceeding the original target of 40,000 jobs. As at end-February 2021, nearly 93,000 applicants have been placed in jobs and skills upgrade opportunities.

Table 4. Singapore: Job Growth Incentive (JGI) Payments		
Program Phases	**Conditions**	**Benefits**
Phase 1: Eligible hires between September 2020 to February 2021 (inclusive)	An increase in overall local workforce size in the firm and an increase in local workforce size earning ≥S$1,400/month, compared to the August 2020	For people below 40 years of age: Up to 25 percent of first S$5,000 for 12 months. For people aged 40 years or more, people with disabilities (PwDs), and ex-offenders: Up to 50 percent of first S$5,000 for 18 months. For wages paid from March 2021 onwards, up to 50 percent of first $6,000 of wages.
Phase 2: Eligible hires between March 2021 to September 2021 (inclusive)	An increase in overall local workforce size in the firm and an increase in local workforce size earning ≥S$1,400/month, compared to the February 2021	For people below 40 years of age: Up to 25 percent of first S$5,000 for 12 months. For people aged 40 years and above, PwDs, and ex-offenders: Up to 50 percent of first S$6,000 for 18 months.

15. To encourage employers to expand local hiring, the government introduced the Jobs Growth Incentive (JGI) in August 2020. The JGI provides up to 18 months of salary support, with enhanced support for workers aged 40 years or more, persons with disabilities, and ex-offenders. The Government has set aside a total of S$6.2 billion (S$1 billion in FY2020 and S$5.2 billion in FY2021) to the JGI.

16. To support jobseekers who may not be able to secure a job immediately, skills opportunities available under the SGUJS package have been extended through March 31, 2022, with higher support for jobseekers aged 40 years and above.

Table 5. Singapore: Skills Opportunities Under the SGUJS Package

Program Components	Description and Benefits
SGUnited Traineeships	• This program provides recent graduates with full-time company-hosted opportunities to gain industry-relevant work experience and build professional networks. The Government co-funds 80 percent of training allowances (up to S$2,500), with the remaining funded by the host company.
SGUnited Mid-Career Pathways	• Mid-Career Pathways Program — Company Attachment: Mid-career individuals can take on a full-time company attachment and gain meaningful industry-relevant experience to boost employability, while receiving a training allowance of up to S$3,800 per month, of which the Government co-funds up to 90 percent.
	• Mid-Career Pathways Program – Company Training: Mid-career individuals acquire industry-relevant skills through training with market-leading companies such as Google, IBM, and Shopee with a provision of monthly training allowance of S$1,500.
SGUnited Skills	• This program is a full-time training program comprising certifiable courses, which are designed in partnership with industry. Trainees will also have the chance to apply the skills learnt during the program, through opportunities like workplace immersions and industry projects. Trainees receive a monthly training allowance of S$1,200.

D. Concluding Remarks

17. Singapore's comprehensive approach to labor market policies has proved effective, including during a major shock such as the COVID-19 pandemic. In particular, the programs have helped keep the unemployment rate low and have provided appropriate support to most affected sectors and lower income people. As such, the programs have been well-targeted and progressive. Resident employment grew by 14,900 in 2020 and a recent report by the Singapore's Ministry of Finance indicated that income inequality, captured by the Gini coefficient for residents, after transfers and taxes, fell to 0.375 in 2020 from 0.398 in 2019.

Annex I. Main Labor Market Policy Responses During COVID-19 Crisis

Description	Target Group	Duration	Funding Support
Jobs Support Scheme (JSS)			
Wage support to employers to help retain local employees	Local Employees (Citizens and PRs)	Declared in February 2020 Covers payments for Oct. 2019 to Sept. 2021	• The Government co-funds between 25% to 75% of the first S$4,600 of gross monthly wages in a 10-month period (Oct 2019 to Aug 2020, except for Jan 2020) • The Government co-funds between 10% to 50% of the first S$4,600 of gross monthly wages in the subsequent 7-month period (Sep 2020 to Mar 2021) • Budget 2021 further extends the JSS program with 10%-30% co-funding for Tier 1 and 2 firms during April-Sept. 2021 • Between May 16, 2021 and June 13, 2021, increased support ratios are applicable at (i) 50 percent for food and beverage, and performing arts and arts education, and (ii) 30 percent for retail, cinema operators, and museums, art galleries and historical sites (Tier-2); and (iii) 50 percent for gyms, fitness studios and other sports facilities, and (iv) 30 percent for indoor playgrounds and other family entertainment centers, and affected personal care services (Tier-3).
Wage Credit Scheme (WCS)			
Government's share in co-funding for WCS increased	Singaporean employees	2019 (retrospectively) to 2021	• The government co-funding ratios for wage increases in 2019 and 2020 are raised to 20% and 15% from the earlier declared rates of 15% and 10% respectively • Budget 2021 further extends the scheme by one year to 2021, with the government co-funding ratio kept at 15% • The qualifying gross wage ceiling is raised to $5,000 for the period 2019-2021, up from the earlier $4,000.
Temporary Relief Fund			
Cash support in case of job loss or income decline	Singapore Citizens or PRs aged 16 years and above who have lost their job or at least 30% of personal income due to COVID-19, and whose prior gross monthly household income is ≤S$10,000, or monthly per capita income is ≤S$3,100	April 2020	The Temporary Relief Fund is a one-off S$500 cash assistance provided to lower- and middle-income Singapore Citizens/Permanent Residents affected by the economic impact of COVID-19, for the month of April 2020 only, before other assistance schemes kick in.
COVID-19 Support Grant (CSG)			
Income Support provided in case of job/salary loss.	Financially affected full-time/part-time local employees (Citizens and PRs) aged 16 years or above who live in a property with value <=S$21,000, whose prior monthly household income <=S$10,000 or per capita income<=S$3,100	May 2020 to December 2020	• Up to S$800 per month for three months in case of loss of job or involuntary no-pay leave for three consecutive months • Up to S$500 per month for three months in case of loss of at least 30 percent of salary for three consecutive months
COVID-19 Recovery Grant (CRG)			
Recovery Grant for workers- grant to support lower to middle-income employees and self-employed persons (SEPs) who are financially impacted by COVID-19	Singapore citizens and PRs aged 21 years or above who live in a property with annual value <=S$21,000, whose prior monthly household income <=S$7,800 or per capita income<=S$2,600	January-December 2021	• Up to S$700 per month for three months to employees who are unemployed due to retrenchment or involuntary contract termination; or placed on involuntary no-pay leave (NPL) for at least three consecutive months • Up to S$500 per month for three months to employees who are facing salary loss of at least 50% on average for at least three consecutive months and self-employed persons who are facing an average loss in net trade income (NTI) of at least 50% over a period of at least three consecutive months, compared to their average monthly NTI in 2019 or 2020.

Description	Target Group	Duration	Funding Support
			• A new Covid-19 Recovery Grant (Temporary) payout was added between May 16, 2021 and June 30, 2021: up to S$700 in case of involuntary no pay leave for a month and up to S$500 in case of 50 percent or more income loss for a month.
Courage Fund			
One-time cash support to household(s) whose member(s) have contracted COVID-19	Households with at least one Singapore Citizen or Permanent Resident whose family member(s) have contracted or succumbed to COVID-19, or are on Stay Home Notice (SHN), mandatory Leave of Absence (LOA), or Home Quarantine Order (HQO) and suffered loss of complete or partial (at least 10%) household income due to COVID-19	Application opened in April 2020; no end date announced	The Courage Fund provides a one-time lump sum of up to S$30,000 (depending on the household's per capita income after being affected by COVID-19). The relief is provided per household, not per individual.
Enhanced Workfare Special Payment			
Workfare Special Payment for Singaporeans who were eligible for Workfare Income Supplement (WIS) for work done in 2019 or 2020	Singaporean employees and self-employed persons aged 35 years and above or with disabilities who have income below S$2,300 per month	2020 and 2021	• Eligible employees and self-employed persons, if they qualified for Workfare Income Supplement (WIS) for work done in WY2019, were provided with S$3,000, paid over two equal payments of S$1,500 each, in July and October 2020. • WSP is again extended to include lower-wage workers aged 35 and above in 2020 who received WIS payment for WY2020, and who have not already qualified for WSP previously. New eligible recipients are to receive the full one-off WSP of $3,000 from October 2020 onwards.
Supporting Self-employed Persons (SEPs)			
Support for self-employment	Local Employees (Citizens)	April 2020 to March 2021	• **SEP Income Relief Scheme:** Cash payment of S$1,000 per month for nine months to eligible Singaporeans • **SEP Training Support Scheme:** Enhanced training allowance at a rate of S$10 (raised from S$7.50) per hour, on top of subsidies that cover up to 90% of course fees
Support for Specific Sectors			
Targeted supports to specific sectors	Residents	Jan-June 2021 for taxi main hirers; and Jan-July 2021 for private hire car drivers	**COVID-19 Driver Relief Fund:** Introduced in 2021 budget, S$133 million is allocated to this Fund to support the taxi and private hire car drivers.
Hiring Incentive and Enhanced Hiring Incentive			
Salary support for employers who hire local workers through eligible reskilling and training programs	Local Employees (Citizens and PRs)	**Hiring Incentive:** 1 Apr 2020 — 26 May 2020 **Enhanced Hiring Incentive:** 27 May 2020 to 31 Aug 2020	Introduced as part of the SkillsFuture Mid-Career Support Package, the Hiring Incentive and Enhanced Hiring Incentive applied to employers who hired local workers who had gone through an eligible reskilling or training programs. The benefits are as follows: • [Hiring Incentive only] Employers that hire a local worker aged 40 and above can receive salary support of 40% for 6 months, capped at $12,000 in total • [Hiring Incentive and Enhanced Hiring Incentive] Employers that hire a local worker aged below 40 can receive salary support of 20% for 6 months, capped at $6,000 in total. *The reskilling and training programs are Career Conversion Programs, Career transition programs delivered by Continuing Education and Training Centers, as well as the SGUnited Traineeships, SGUnited Mid-Career Pathways and SGUnited Skills programs.

Description	Target Group	Duration	Funding Support
Jobs Growth Incentive (JGI)			
Salary support to encourage employers to expand local hiring	Singapore citizens and PRs	**Phase 1:** September 2020 to February 2021 **Phase 2:** March 2021 to September 2021	**Phase 1:** Persons aged below 40 years- up to 25% of first S$5,000 for 12 months; Persons aged 40 and above, persons with disabilities (PwDs), and ex-offenders: up to 50% of first S$5,000 for 18 months. For wages paid from March 2021 onwards, up to 50 percent of first $6,000 of wages. **Phase 2:** Persons aged below 40 years: Up to 25% of first S$5,000 for 12 months; Persons aged 40 and above, PwDs, and ex-offenders: Up to 50% of first S$6,000 for 18 months. However, for companies to be eligible for the JGI, they must show an increase in overall local workforce size and increase in local workforce size earning ≥S$1,400/month.
New Jobs and Training			
SGUnited Jobs and Skills Package to provide support for locals to enter new jobs or take up meaningful skills opportunities	Singapore citizens and PRs	May 2020 through March 2022	• Nearly 76,000 placements into jobs and skills opportunities as at end-December 2020, of which 59,400 were into jobs, with the remaining in company-hosted traineeships and attachments as well as training. opportunities. Trainees receive an allowance which is either co-funded, or fully funded by the Government. • In 2021, budget has been set aside to provide 35,000 traineeships, attachments and training opportunities.
Foreign Worker Levy (FWL) rebates and waivers			
Foreign Worker Levy waivers given, and FWL rebates granted	Employers with foreign workers (holding S pass or work permit)	April 2020 to Dec 2021	• The FWL for the month of April and May 2020 waived and a FWL rebate of S$750 per month for the months of April and May 2020 (from levies paid in the year 2020) granted for each work permit or S Pass holder, with payout accelerated to help businesses manage costs. • For businesses which were not allowed to resume operations after the "circuit breaker", the FWL waiver and rebate extended by up to 2 months as follows: 100% waiver and $750 rebate for June 2020; and 50% waiver and $375 rebate for July 2020. • The support for businesses in the Construction, Marine Shipyard and Process sectors has been further extended until December 2021 as follows: Waiver — 100% waiver in July, August and September 2020, 75% waiver in October 2020, 50% waiver in November 2020 and 25% waiver in December 2020. However, 100% waiver of FWL is applicable for the period during which workers are under Stay-Home Notice (SHN). Rebate — S$375 rebate in August and September 2020; S$90 rebate from October 2020 to April 2021, and S$250 rebate payment during May-December 2021.

Sources :
- https://www.iras.gov.sg/irashome/schemes/businesses/jobs-support-scheme—JSS-/
- https://www.singaporebudget.gov.sg/budget_2020/resilience-budget#SupplementaryBudgetMeasures
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- https://www.gov.sg/article/how-the-fortitude-budget-2020-will-support-singapores-workers

Note: Residents indicate both citizens and permanent residents

THE DIGITAL ECONOMY: A POTENTIAL NEW ENGINE FOR PRODUCTIVITY GROWTH[1]

Globally, the COVID-19 pandemic and associated safe distancing measures have accelerated the digital revolution. A similar dynamic is taking place in Singapore, a country at the forefront of digital usage, including through unprecedented growth of e-commerce. An empirical analysis of sector-level labor productivity growth in advanced economies, including Singapore, suggests that digitalization and innovation, captured through e-commerce, robotization, and research and development, are associated with higher labor productivity growth. Singapore has scope for a sizeable expansion of e-commerce (despite recent rapid growth) and of research and development. This would help the country further reap the benefits of the digital economy, notably through higher productivity growth, and accelerate economic transformation.

A. The Digital Economy Landscape in Singapore

1. A generally agreed-upon definition of the digital economy is yet to emerge. A narrow definition of the digital economy refers to the information and communication technology (ICT) sector, including telecommunications, the Internet, ICT services, hardware and software. A broad definition of the digital economy includes both the ICT sector and parts of traditional sectors that have been integrated with digital technology (IMF, 2018). Considering the diversity of digital innovations, the lack of a generally agreed-upon definition of the digital economy, and the sparsity of data, this annex focuses on two specific areas related to the use of digitalization: the digitalization of production (robotics) and the digitalization of consumption (e-commerce), as well as broader innovation that tends to support the supply of digitalization.[2]

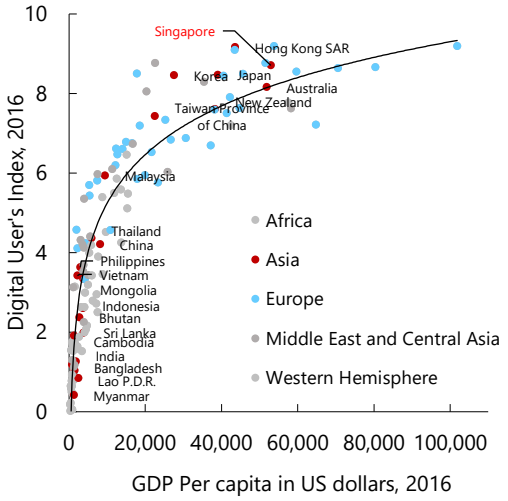
2. Singapore is at the forefront of digital usage. The digital user's index, which captures various aspects of mobile and internet usage, highlights Singapore's relatively high digital usage compared to countries in Asia, the region with the highest dispersion in digital technologies adoption across countries (Figure 1).[3] Singapore also stands out as one of the countries with the largest digital usage among peers. Singapore is at a mature stage of the digital momentum, characterized by relatively smaller increases in the digital usage index (Figure 2).

[1] Prepared by Tidiane Kinda (APD), with research assistance from Kaustubh Chahande (APD).

[2] Chapter 4 on *E-Payments During the COVID-19 Pandemic and Beyond* focuses on the digitalization of finance, another growing aspect of the digital economy.

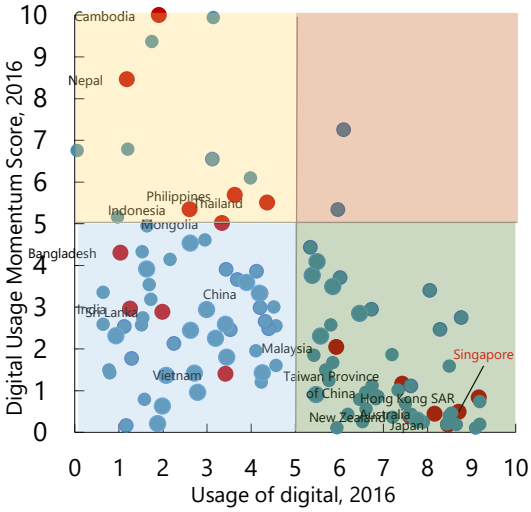
[3] The digital user's index is a composite index averaging six indicators: mobile phone subscriptions in terms of subscriptions per 100 population; percentage of individuals using the Internet; percentage of households with a personal computer; percentage of households with Internet access; fixed broadband Internet access in terms of subscriptions per 100 population; and mobile-broadband subscriptions in terms of subscriptions per 100 population.

Figure 1. GDP per Capita and Digital Usage
(Index 0–10)



Sources: IMF, World Economic Outlook; World Economic Forum; and IMF staff calculations.

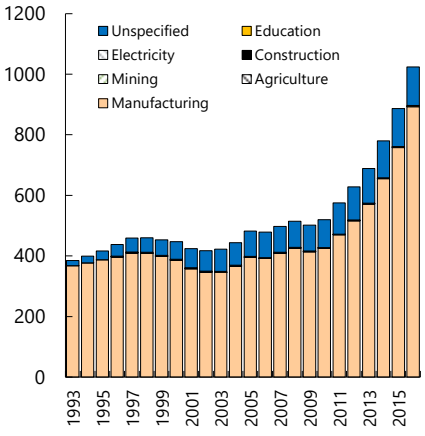
Figure 2. Digital Usage: Level and Momentum
(Index 0–10; Momentum change 2012–16)



Sources: IMF,World Economic Outlook; World Economic Forum; and IMF staff calculations.

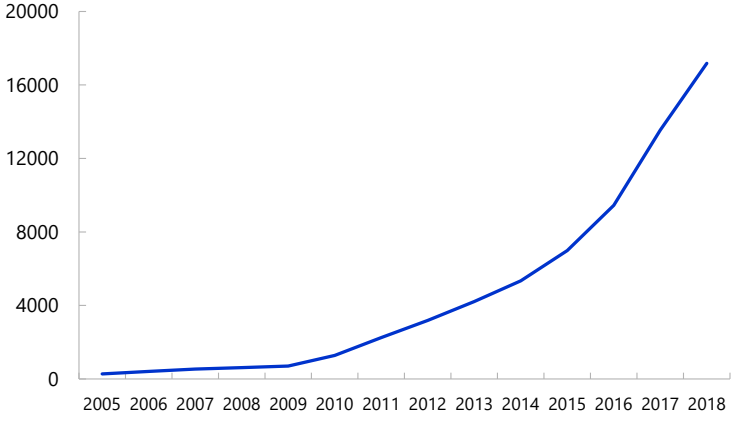
3. Singapore has made significant strides in the digitalization of production through industrial robots. Industrial robots are higher-end digitalization products predominantly used for automation in the manufacturing sector (Figure 3). Singapore's stock of operational robots in the manufacturing sector has rapidly increased during the past decade, from about 600 robots in 2008 to above 17,000 robots in 2018 (Figure 4). This rapid increase has translated into a rise in robot density from about 1 operating robot per 1,000 employees in 2008 to 45 operating robots per 1,000 employees in 2018, making Singapore one of the top users of industrial robots in the world (Figure 5). Most of the industrial robots in Singapore are used in the semiconductor sub-sector, which accounted for 70 percent of all industrial robots in 2018 (Figure 6).

Figure 3. Asia: Industrial Robots by Industry
(Thousands of robots)



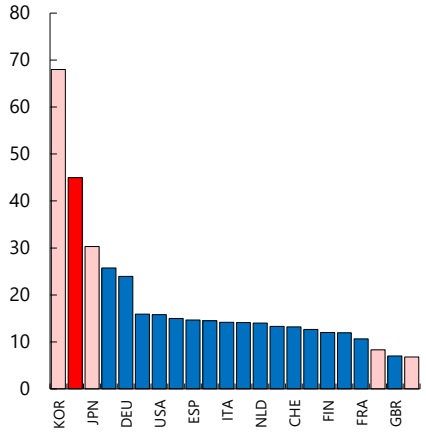
Source: International Federation of Robotics (2017).

Figure 4. Singapore: Operational Stock of Robots in Manufacturing
(Units)



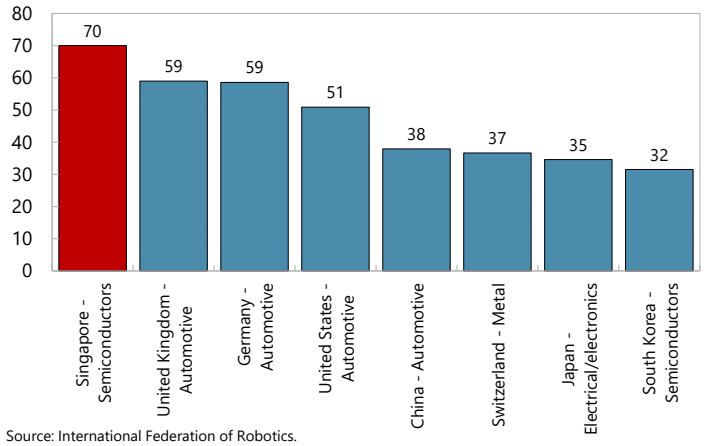
Source: International Federation of Robotics.

Figure 5. Robot Density in Manufacturing, 2018 or latest
(Number of industrial robot stock, per 1,000 employees)



Source: International Federation of Robotics.

Figure 6. Singapore: Concentration of Industrial Robots, 2018
(Top destination (sub-sector) of industrial robots as a share of total, Percent)



Source: International Federation of Robotics.

4. E-commerce has been thriving in recent years in Singapore, including in response to the COVID-19 pandemic, a trend that may continue post-pandemic. From about 0.3 percent of GDP in 2017, business-to-consumer e-commerce sales as a share of Singapore's GDP more than doubled to about 0.7 percent of GDP in 2020 (Figure 7). In 2020, e-sales grew by 32 percent in Singapore, one of the fastest growth rates among peers in Asia and advanced economies (Figure 8).[4] The acceleration in e-sales observed in 2020, including in response to the COVID-19 pandemic, may last longer, supported by a conducive digital environment. A survey conducted by Rakuten Insight found that close to 80 percent of respondents in Singapore stated that they would continue to buy products online even when businesses are open and social distancing measures are lifted (Figure 9).

5. Singapore still has sizeable scope to expand e-commerce, supported by a conducive e-environment. Despite the rapid growth in recent years, e-commerce in Singapore remains under 1 percent of GDP in 2020, well-below the level in most peer Asian and advanced economies (Figure 10). Yet, Singapore ranks among the countries with the highest readiness to e-commerce, measured by indicators that capture the use of secure internet services, the reliability of postal services for last mile delivery, and access to a financial account for payments (Figure 11). E-payment adoption among firms has also increased substantially in recent years, with more than 80 percent of firms having adopted e-payments by 2019 (Figure 12).

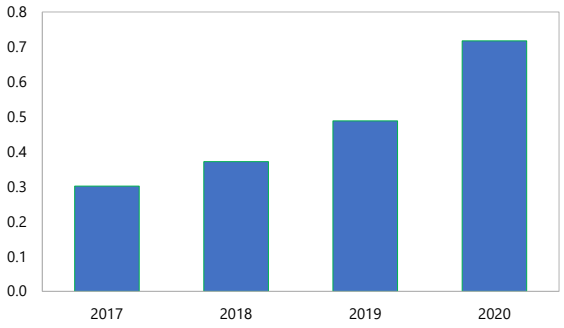
6. Singapore has scope for larger research and development (R&D) to support broader innovation. While the digital component of the economy, proxied narrowly by the share of the ICT sector, is relatively large in Singapore (Figure 13), innovation in the country is tilted towards ICT.[5] Patents in ICT, which may ultimately develop into digitalization products, represent close to 40

[4] The data on e-commerce sales in this paper are specifically collected from Statista's Digital Market Outlook. E-commerce sales refer to business-to-consumer digital commerce and do not include digitally distributed services, digital media downloads or streaming services, online booking, business-to-business digital commerce, and consumer-to-consumer digital commerce.

[5] The GDP contribution of the ICT sector is approximated by the sum of GDP from two subsectors: (1) information and communication and (2) computers, electronics, and optical products.

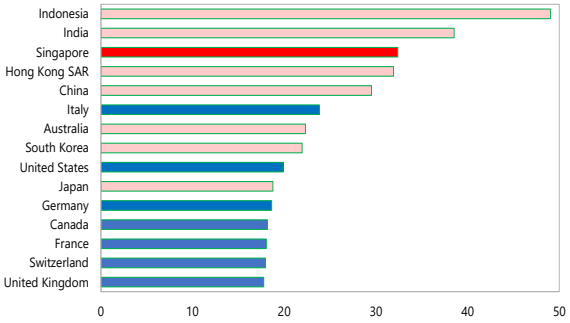
percent of total patents (Figure 14). Singapore's share of "triadic" patent families, that is all patent applications filed in Japan, Europe, and the United States, is relatively low compared to peer Asian economies and advanced economies (Figure 15). Consistent with low patent filling, Singapore's R&D expenditure has been relatively low and broadly constant in recent decades. This contrasts with the rapid growth and higher spending levels in R&D observed in many economies such as Korea, Switzerland, and Taiwan Province of China between 2000 and 2018 (Figure 16). Indeed, while Singapore ranked first in the World Economic Forum's Global Competitiveness Overall Index in 2019, the country ranked 21st in research and development with relatively lower score (rank of 23rd) in scientific publications.

Figure 7. Singapore: E-commerce Sales
(In percent of GDP)



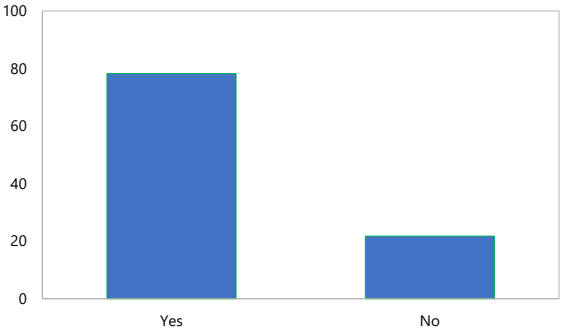
Sources: Statista; and staff estimates.

Figure 8. E-sales Growth Across Economies, 2020
(Percentage change, Y/Y)



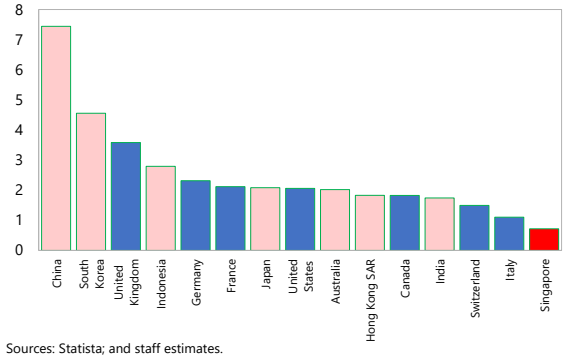
Sources: Statista; and staff estimates.

Figure 9. Singapore: Consumers to Continue Online Shopping Post-pandemic
(In percent)



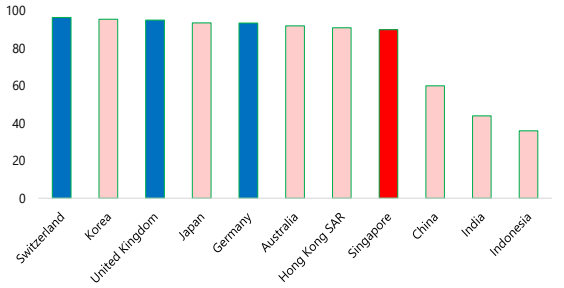
Sources: Rakuten Insight survey of May 2020; and staff estimates.

Figure 10. E-sales Across Selected Economies, 2020
(In percent of GDP)



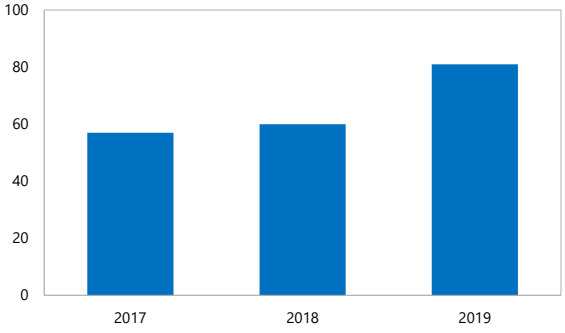
Sources: Statista; and staff estimates.

Figure 11. E-commerce Readiness Index 1/



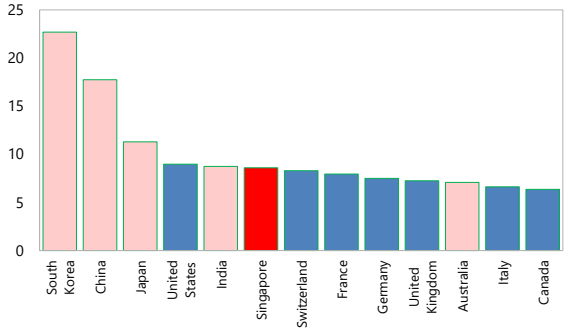
Source: United Nations Conference on Trade and Development B2C E-commerce Index.
1/ The B2C E-commerce Index is the simple average of four indicators: (1) the percentage share of individuals in the total population using the Internet; (2) the postal reliability score scaled between 0 and 100; (3) the percentage share of individuals in the total population with a financial account; and (4) an indicator of secure Internet server availability scaled between 0 and 100.

Figure 12. Singapore: Share of Enterprises that Adopted E-payments
(In percent)



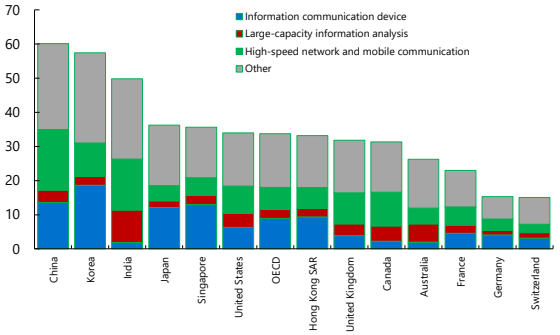
Sources: 2019 IMDA Annual survey on infocomm usage by enterprises.

Figure 13: ICT Sector as a Share of GDP, 2017 or latest
(In percent of GDP)



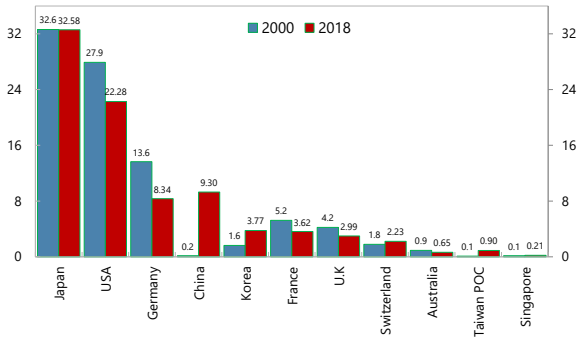
Sources: European Commission; and staff estimates.

Figure 14. Specialization in ICT-related Patents, 2012-15
(Patents in ICT as a percentage of total IP5 patent families)



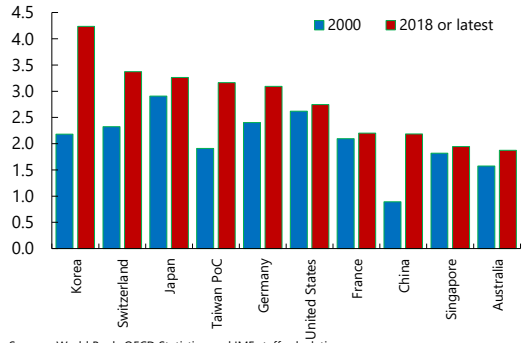
Sources: Organization for Economic Cooperation and Development Science Technology, and Innovation Micro-data Lab: Intellectual Property; and IMF staff calculations.

Figure 15. Share of Economies in Triadic Patent Families
(Percent)



Source: Organization for Economic Cooperation and Development Statistics.

Figure 16. R&D Expenditure
(Percent of GDP)



Sources: World Bank; OECD Statistics; and IMF staff calculations.

B. Digitalization, Innovation, and Productivity Growth

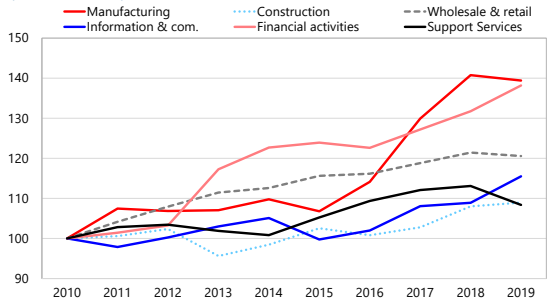
7. This section explores how digitalization and innovation may influence productivity growth, building on the existing limited literature. The emerging empirical evidence highlights the positive role of digitalization on productivity. For instance, Falk and Hagsten (2015) show that an increase in e-sales by 1 percentage point raises firm-level labor productivity growth by 0.3 percentage points on average in 14 European economies, with a larger effect for small firms and for firms in the services sector. Yang, Shi, and Yan (2017) show that e-commerce participation has the potential to positively impact firm productivity in China. World Bank (2016) shows that firms using e-commerce in Vietnam had on average 3.6 percentage points higher total factor productivity growth than firms not using e-commerce. Kinda (2019) shows that Asian firms engaged in e-commerce have on average 30 percent higher total factor productivity than other firms. Using robot shipment data at the industry and year levels across 17 countries, Graetz and Michaels (2015) find that robots may have increased productivity growth by more than 15 percent and account for about one-tenth of the increases in GDP between 1993 and 2007 (Seamans and Raj, 2018).

8. The analysis draws on sector-level cross-country labor productivity data. Data on value added per worker by industry, our proxy to define labor productivity growth, is from the OECD database and matched with data on Singapore from the Singapore Department of Statistics.

Because of limited data availability, our sample covers 22 advanced economies during the period 2000-2019.[6]

9. Labor productivity growth has recently stagnated in most service-oriented sectors in Singapore. While labor productivity has experienced a robust growth in the manufacturing sector since 2015, most service sectors, with the exception of financial services as well as information and communications, have experienced limited to no growth in labor productivity during the same period (Figure 17). More robust cross-country conditional correlations confirm that most service activities have had lower labor productivity growth compared to the manufacturing sector, including in Singapore (Table 1).

Figure 17. Singapore: Labor Productivity by Sector
(Index: 2010=100)



Note: Support Services includes Professional Services, Administrative & Support Services, and Other Services Industries.
Sources: Singapore, Dept. of Statistics & Ministry Of Manpower; and IMF staff calculations.

10. The empirical strategy investigates the potential role of digitalization and innovation on labor productivity growth, through the following equation:

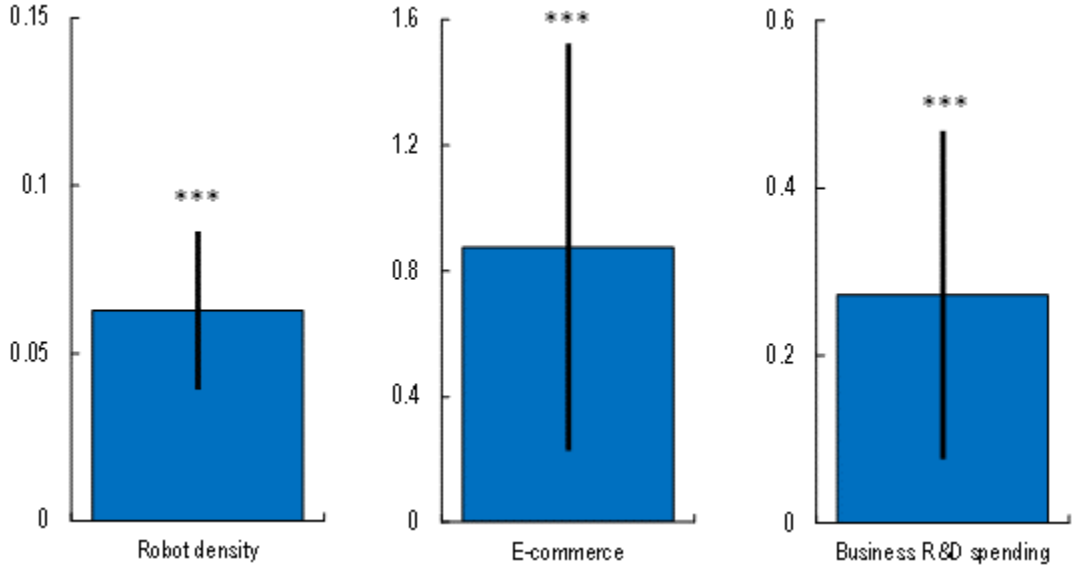
$$\Delta LP_{ijt} = \alpha + \gamma \boldsymbol{Dig}_{ijt} + \delta X_{ijt} + \varphi b_i + \eta I_j + \theta t_t + \epsilon_{it}$$

Where ΔLP_{ijt} captures the annual labor productivity growth rate of country i in sector j at time t. Dig_{ijt} represents the digitalization or innovation proxy either at the country level (e-commerce, robot density) or country-sector level (business R&D expenditure). X_{it-1} includes control variables such as sectoral inward FDI as a share of GDP to gauge the extent of inbound know-how transfer; and the trade to GDP ratio to capture openness to international trade. b_i, I_j, and t_t represent respectively country, sector, and time fixed effects. Beyond unobservable fixed factors, controlling for country and industry fixed effects allows us to account for time-invariant characteristics such as being a financial center. By controlling for common shocks across all countries and industries in a given year, for instance the global financial crisis, time fixed effects allow us to focus on the time varying structural aspects of digitalization and innovation that are deemed important for productivity growth. ϵ_{it} is the error term.

11. The results highlight that digitalization and innovation are associated with higher labor productivity growth (Figure 18 and Table 2). The baseline results show that overall, a larger share of e-commerce to GDP or a higher robot density are associated with higher labor productivity growth. Higher business R&D spending is also associated with higher labor productivity growth.

[6] The sector-level categorization comprises 6 sub-sectors: manufacturing; construction; wholesale and retail trade; information and communication; finance and insurance; and business services. Countries in the largest sample are Austria, Belgium, Canada, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Netherlands, Norway, Portugal, Singapore, South Korea, Spain, Sweden, Switzerland, United Kingdom, and United States.

Figure 18. Estimation Results: Digitalization, Innovation, and Labor Productivity Growth 1/



Source: Author's estimates.
1/ These figures illustrate coefficients and confidence intervals from three sector-level cross-country estimations of the potential effect of digitalization and innovation on labor productivity growth controlling for sectoral inward FDI, openness to trade, and cross country-industry and time fixed effects. The error bars refer to the 95 percent confidence intervals around the estimated coefficients. ** p<0.05; *** p<0.01.

12. The main results are robust to a variety of tests. As the digital revolution is still unfolding, its impact on productivity may increase over time. We do not find evidence that the digitalization of production or consumption has been associated with larger productivity growth in more recent years (Table 3).

13. While difficult to estimate due to data limitations, productivity spillovers from highly digitalized sectors to other sectors may support economy-wide productivity. For instance, Javorcik (2004) finds evidence of positive productivity spillovers from highly productive foreign firms to their local suppliers in upstream sectors in Lithuania. Kinda (2012) also shows that local firms, particularly small-local firms, that supply the most efficient firms have higher productivity, illustrating the existence of vertical spillovers through backward linkages.

C. Implications of the Results for Singapore: Fostering a Smarter Economic Recovery Post-Pandemic

14. The results suggest that boosting e-commerce and R&D would support productivity growth, the nascent recovery, and the transformation towards a smarter economy. The analysis highlighted that Singapore has room for a significant expansion of e-commerce and larger R&D, two elements that are associated with higher labor productivity growth. As such, further digitalization has the potential to boost aggregate productivity growth and presents an opportunity to lift medium-term growth prospects.

15. Singapore has introduced many initiatives to support digitalization. For instance, the Infocomm Media Development Authority's (IMDA) *SMEs Go Digital* program supports SMEs' adoption and use of digital technologies through various channels, including foundational digital solutions for new SMEs (*Start Digital Pack*); guidance on digital solutions and training required for each development stage of a firm (*Industry Digital Plan*); provision of business-to-business and business-to-consumer e-commerce platforms to help firms reach global markets (*Grow Digital*); consultancy services to support firms' use of digital technologies (*SME Digital Tech Hub*); pre-approved and proven SME-friendly solutions that can be adopted with the support of government grants such as the Productivity Solutions Grant (*PSG*). IMDA has also launched programs to accelerate the scale and speed of digital innovation (*Open Innovation Platform*); and adopted a multi-prong approach to facilitate the development of 5G in Singapore (*5GSG*), including by facilitating applications in selected industries, supporting a sound and forward-looking regulatory framework, and grooming talent.

16. In addition to boosting productivity growth, advancing the digitalization of the economy can increase tax revenues. While the digital tax base is still modest in most countries, including Singapore, the ongoing digital revolution and associated rapid growth of the sector present an opportunity to raise additional revenues in the medium to long-term, provided that a tax system commensurate to the digital economy is in place.

17. While this annex focuses on opportunities for productivity growth that may be associated with the digital economy, the latter also brings about some challenges. Policies to accelerate the digital transformation and reap its benefits should also give due consideration to challenges associated with digitalization, including labor displacements and possible rise in inequality (Saadi Sedik and Yoo, 2021). This calls for complementary labor market policies, such as skills upgrades and training to address and possibly catalyze on the distributional challenges associated with the digital revolution. Fortunately, Singapore is already at the forefront in designing such policies.

Table 1. Singapore: Labor Productivity Growth Across Activities

	Dependent Variable: Labor Productivity Growth (5-year moving average)		Dependent Variable: Labor Productivity Growth (3-year moving average)	
	All Countries	Singapore	All Countries	Singapore
	(1)	(2)	(3)	(4)
Sector (manufacturing is the benchmark)				
Construction	-2.637***	-0.907	-2.559***	-1.431
	(0.199)	(0.815)	(0.232)	(0.997)
Wholesale, retail, trade, accommodation, etc.	-1.884***	-1.929**	-1.820***	-2.349**
	(0.199)	(0.815)	(0.232)	(0.997)
Information and communication	0.389*	0.0428	0.309	-0.760
	(0.199)	(0.815)	(0.232)	(0.997)
Financial and insurance activities	-0.673***	-0.0341	-0.633***	-0.624
	(0.199)	(0.815)	(0.232)	(0.997)
Professional, scientific and support services, etc.	-2.727***	-2.410***	-2.627***	-2.911***
	(0.199)	(0.815)	(0.232)	(0.997)
Time Fixed-Effects	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes		Yes	
Observations	2,388	114	2,388	114
R-squared	0.271	0.291	0.216	0.318

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2. Singapore: Baseline Regressions

	Dependent Variable: Labor Productivity Growth (5-year moving average)		
	(1)	(2)	(3)
Robot Density	0.0626***		
	(0.0120)		
E-commerce sales		0.876***	
		(0.329)	
R&D spending			0.272***
			(0.0999)
Inward FDI	0.0502***	0.0202*	0.0377***
	(0.00746)	(0.0113)	(0.0100)
Trade Openness	0.00297	0.00142	0.00124
	(0.00214)	(0.00306)	(0.00292)
Constant	4.119***	0.621	0.963
	(1.312)	(0.953)	(2.676)
Time Fixed-Effects	Yes	Yes	Yes
Country*Sector Fixed Effects	Yes	Yes	Yes
Observations	1,445	324	912
R-squared	0.442	0.851	0.472

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3. Singapore: Robustness Check: Possible Structural Change in Digitalization

	Dependent Variable: Labor Productivity Growth (5-year moving average)					
	All Years	Post-2015	All Years	Post-2017	All Years	Post-2015
	(1)	(2)	(3)	(4)	(5)	(6)
Robot Density	0.0626***	0.0254**				
	(0.0120)	(0.0107)				
E-commerce sales			0.876***	0.706*		
			(0.329)	(0.390)		
R&D spending					0.272***	0.327**
					(0.0999)	(0.140)
Inward FDI	0.0502***	0.0180**	0.0202*	0.0254*	0.0377***	0.00457
	(0.00746)	(0.00883)	(0.0113)	(0.0147)	(0.0100)	(0.0124)
Trade Openness	0.00297	-0.00239	0.00142	0.000827	0.00124	0.00380
	(0.00214)	(0.00262)	(0.00306)	(0.00381)	(0.00292)	(0.00481)
Constant	4.119***	1.493**	0.621	1.021	0.963	0.965
	(1.312)	(0.740)	(0.953)	(1.136)	(2.676)	(1.274)
Time Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Country*Sector Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,445	348	324	207	912	179
R-squared	0.442	0.866	0.851	0.899	0.472	0.890

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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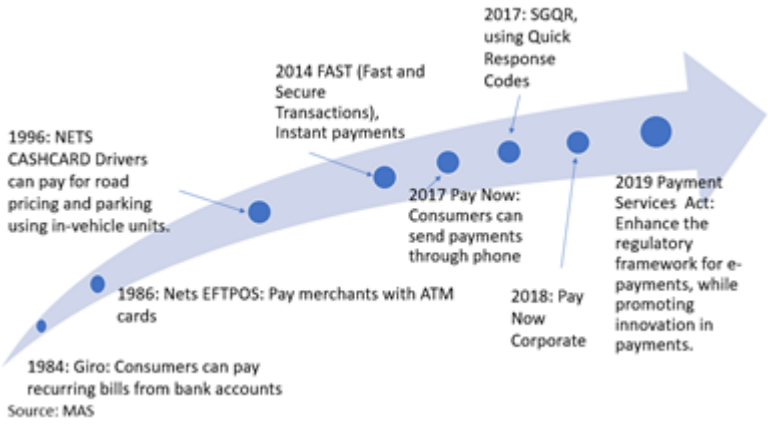
E-PAYMENTS DURING THE COVID-19 PANDEMIC AND BEYOND[1]

The use of E-payments in Singapore has continued to grow strongly during the COVID-19 pandemic, reflecting the ease of use and convenience during the circuit breaker movement restrictions. Despite the increased use of e-payments, however, cash use remains relatively high and entrenched. After documenting recent trends in e-payments and cash use in Singapore, this paper draws on international experience to discuss policies to build financially inclusive payments infrastructures to give all segments of the population access to e-payments, while ensuring data privacy, competition, and innovation.

A. Cash Use and E-payments in Singapore

1. The infrastructure for E-payments in Singapore has developed over time. The use of E-payments has grown following the introduction of credit cards in the 1970s; General Interbank Recurring Order (GIRO) and Electronic Fund Transfer at Point of Sale (EFTPOS) in the 1980s; contactless stored value EZ-Link cards for use in public transit in 2002; and real-time payment innovation and e-wallets for mobile phones in the 2010s (Figure 1). The Fast and Secure Transfers (FAST) instant payment was introduced in 2014 enabling real-time electronic funds transfer in Singapore dollars. PayNow – a peer-to-peer transfer service running on top the FAST system – was introduced in 2017 and enables instant digital payments between accounts using mobile numbers, national identification numbers, or a unique entity number. Currently, 23 banks participate in FAST, of which nine offer PayNow. The domestic banks also offer e-wallets that run on the PayNow system. In 2017, Singapore Quick Response (SGQR) codes were introduced to provide a unified standard for merchant static quick response codes.

Figure 1. Singapore: E-payments



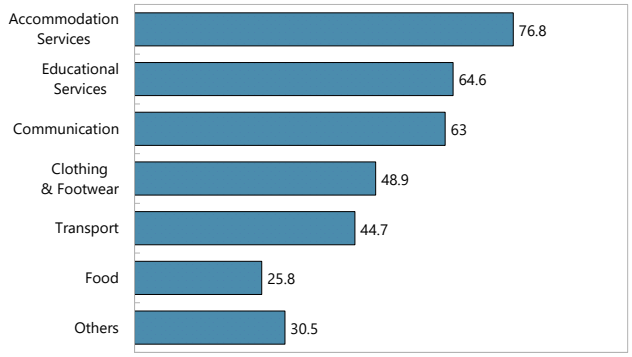
2. The adoption of e-payment is widespread among the public with some variability across income levels and spending categories. The 2017/18 Household Survey (Singapore Statistics, 2019; see Figures 2-3) found that 36.7 percent of household expenditure is made through e-payments. While the majority of households use e-payments for their expenditure, the proportion

[1] Prepared by Dan Nyberg, Asia and Pacific Department.

of households with e-payments is lowest in the lowest income quantile. Among spending items, e-payments on food is relatively low at 25.8 percent, while accommodation services top the chart at 76.8 percent. In this context, the MAS recent selection of successful applicants for digital bank licenses in December2020 is expected to increase the accessibility of digital solutions to underserved areas of the market.

Figure 2. Share of E-Payment Expenditure for Selected Types of Goods & Services, 2017-18

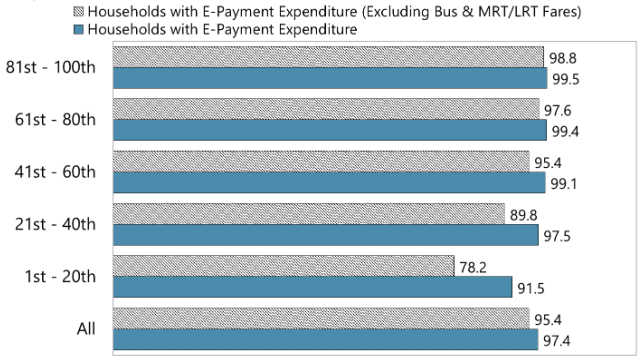
(In percent)



Sources: Singapore Department of Statistics.

Figure 3. Proportion of Households with E-Payment Expenditure by Income Quintile, 2017-18

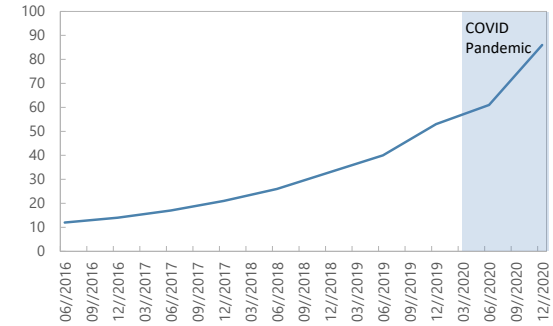
(In percent)



Sources: Singapore Department of Statistics.

Figure 4. Singapore: Retail Payments, FAST

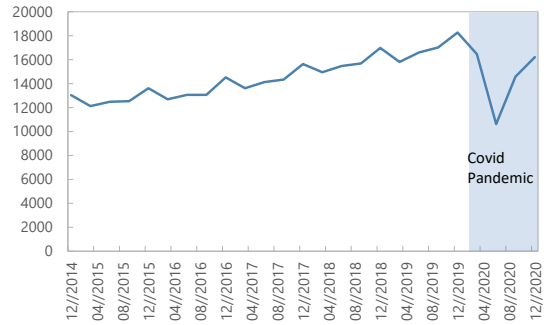
(Volume S$ mn)



Sources: CEIC

Figure 5. Singapore: Total Credit Card Billings

(In S$ mn)



Sources: MAS and CEIC.

3. The use of real-time e-payments has continued to increase during the pandemic. The volume of FAST e-payments has increased by an average exceeding 50 percent per year since 2016 (Figure 4). Despite an economic contraction in 2020, the growth rate of FAST e-payments accelerated, with the volume of transactions increasing from 15.5 million per month to 24.5 million. However, the average size of FAST transactions declined slightly from S$1,592 to S$1,434 in 2020, possibly reflecting increased use of the FAST payments for smaller purchases online (Table 1). PayNow use increased strongly in 2020 across all proxies: (i) mobile phone number users increased by 30 percent, to around 2.8 million users; (ii) national ID number users grew by 80 percent (YoY), driven by government support disbursements during the pandemic, with around 2 million users; and (iii) unique entity numbers for companies doubled in 2020 to around 250,000 users, also supported by government pandemic-related disbursements for companies. PayNow transactions usage also displayed strong growth, with individual transactions volumes almost doubling (YoY) to 125 million in 2020, while PayNow Corporate volumes increased six times (YoY) to 19 million in 2020. SGQR

deployments almost doubled in 2020, with more than 120,000 SGQR labels deployed during the year.[2] In contrast, the volume of Inter-bank GIRO transactions remained broadly stable in 2020, compared to a year ago (Table 1). The volume of cheque clearing continued its structural decline during the pandemic (Table 1). Overall, the use of credit cards dropped in the first half of 2020, both in terms of volumes and values as macroeconomic uncertainty and the income shock constrained spending (Figure 5).

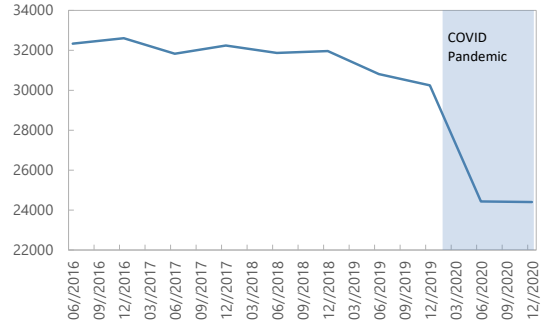
Table 1. Singapore: Automated Clearing House Payment Systems

	2018	2019	2020
Singpore Dollar Cheque Clearing			
Volume (mn)	52	45	30
Value (SGD mn)	589,606	505,603	381,012
Average Size	11,339	11,236	12,700
US Dollar Cheque Clearing			
Volume (mn)	0.81	0.76	0.55
Value (USD mn)	48,062	47,561	36,227
Average Size	59,336	62,580	65,867
Inter-bank GIRO			
Volume (mn)	109	112	109
Value (SGD mn)	418,592	451,438	453,509
Average Size	3,840	4,031	4,161
FAST			
Volume (mn)	60	93	147
Value (SGD mn)	108,232	148,055	210,795
Average Size	1,804	1,592	1,434

Source: CEIC and Fund Staff Calculations.

4. ATM cash withdrawals fell sharply during the pandemic. Generally, there is good access to ATMs across Singapore, supporting cash use. There are over 220 retail bank branches, and more than 2,660 ATMs located across Singapore (MAS, 2021). The number of ATMs has been stable at 59 per 100,000 residents from 2012 to 2019. By comparison, the number of ATMs in Sweden—one of the leaders in e-payments use—decreased from 43 in 2012 to 32 in 2018 (World Bank, 2021).[3] The volume of cash withdrawals per month in Singapore has

Figure 6. Singapore: ATM Withdrawals
(S$ mn)



Sources: CEIC

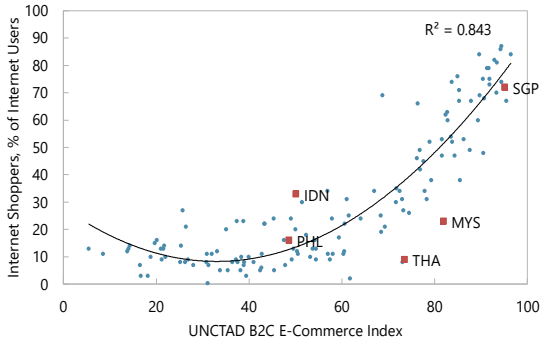
[2] The infrastructure-light solution offered by SGQR allowed many merchants in Singapore to quickly start accepting digital payments without the costly infrastructure associated with POS terminals.

[3] Sweden also has a long-standing policy of encouraging cash-less transaction and the banking association has contributed to this by launching a popular mobile payments app, Swish (see Williams and Wang, 2017).

fallen sharply during the COVID pandemic owing to movement restrictions (Figure 6).

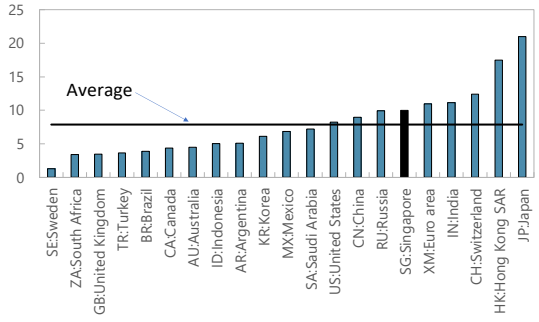
5. The government's aims to further increase the role of e-payments is well-placed. Supplying cash to society is costly, estimated to cost around 0.5 percent of GDP in Singapore (Menon, 2016). Moreover, cash can facilitate tax evasion and illicit activities (Rogoff, 2015). The use of ecommerce is widespread among internet users and Singapore's readiness for e-commerce is conducive to further growth in e-sales (see also Chapter 3 and Figure 7). E-payments are also a key component of a Smart Financial Centre agenda to promote a culture of innovation in the financial sector.[4] In November 2020, MAS announced the launch of a new Application Programming Interface gateway, which enables real-time payments interoperability. The government has several initiatives that will be implemented in 2021, including allowing non-bank financial institutions in Singapore to have direct access to PayNow and FAST, which will enable e-wallet users to transfer funds between bank accounts and across different e-wallets. Most e-wallets currently can be topped up only via credit or debit cards and funds cannot be transferred between e-wallets.[5] Non-bank financial institution access to PayNow has paved the way for the launch of a new proxy, Virtual Payment Address (VPA), which will allow customers to map the same mobile number across multiple wallets.

Figure 7. E-commerce Ranking
(X-axis: Index, 0-100; Y-axis: Percent)



Sources: UNCTAD

Figure 8. Cash in Circulation, 2019
(In percent of GDP)



Sources: BIS CPMI

6. Nonetheless, despite rapid payment system innovation and fast-growing e-commerce, cash use remains entrenched in Singapore. Under the Currency Act, MAS has the sole right to issue currency notes and coins in Singapore, and cash remains the most widely accepted payment medium for small-value transactions. It is estimated that cash is used in around 60 percent of all retail transactions in Singapore (KPMG, 2016). Currency in circulation, taken as a proxy for cash use, is relatively high in Singapore, at around 10 percent of GDP, and has been relatively stable over the past five years. The range of cash use varies widely among

[4] For details on the Smart Financial Center agenda, see https://www.mas.gov.sg/news/speeches/2015/a-smart-financial-centre.

[5] MAS has encouraged Singaporeans to use e-hong baos (monetary gifts) during the Lunar New Year to reduce queues for physical notes and be more environmentally friendly. E-gifting helps to reduce the carbon emissions generated by the production of new notes for each Lunar New Year, estimated to be about 330 tons currently. E-hong baos are part of a larger shift towards e-gifting that MAS and ABS are promoting and the most innovative FinTech e-gifting solution will receive special recognition at the Singapore FinTech Festival in November 2021.

comparator economies, from 1 percent of GDP in Sweden, where cash use has decreased significantly owing to Fintech innovation and e-payments adoption, to over 20 percent in Japan (Figure 8). The average for countries that report to the BIS Committee for Payments and Markets Infrastructure (CPMI) database is around 8 percent of GDP.

B. What Explains Cash Use?

7. There is a long-standing literature on the reasons why the public demands and holds cash (Keynes, 1936; Baumol, 1952), emphasizing the role of cash as medium of exchange and store of value:

- ***Medium of exchange.*** Paying for goods and services is the most obvious reason to hold cash as it is widely accepted, reliable, anonymous, easy to use, and does not require a bank account or mobile phone. Some merchants are also reluctant to accept e-payments owing to the cost of transacting (e.g. cost of terminals and fees per transaction). Png and Tang (2020) find based on cross-country estimates that the use of cash in retail transactions increases with concern for privacy and decreases with trust in banks.
- ***Store of value.*** In situations of political or economic turmoil, people hold cash as a store of value to insulate their assets from potential economic and institutional instability.

Against this background, variables such as incomes, interest rates, age structure of the population, and macroeconomic uncertainty can be important determinants of cash holdings. As incomes rise, people tend to hold proportionately less cash. At the same time, holding cash is costly in that the interest rate is the opportunity cost that one could earn on a savings account or other investments. If interest rates increase, people tend to cut back on cash holdings. Economic and political uncertainty are additional factors that may affect the demand for cash. As the use of cash is highly entrenched and habits change slowly, the age structure of society may also help explain the prevalence of cash.

8. **A panel econometric model is used to explain cash use.** Using data for 20 advanced and emerging market economies that participate in the BIS CPMI (see Figure 8 above), the empirical equation below models currency in circulation (CiC) using, as explanatory variables, GDP per capita as an indicator of income, an economy-specific financial conditions (FCI) index as a proxy for economic and political uncertainty, the interbank interest rate (representing the opportunity cost of holding cash), the average age of the population, and measures of digitalization:

$$CiC_{i,t} = \alpha + \beta \times GDP^{PC}_{i,t} + \gamma \times FCI_{i,t} + \delta \times Int_{i,t} + \phi \times Age_{i,t} + \theta \times Ddt_{i,t} + \epsilon_{i,t}.$$

$GDP^{PC}_{i,t}$ is the nominal GDP divided by population; $FCI_{i,t}$ is a measure of financial and macroeconomic uncertainty (IMF, 2017); *Int* is a short-term interest rate for economy i at time t; *Age* is the average age of the population for economy i at time t; and $Ddt_{i,t}$ proxies digitalization for

economy *i* at time *t* as measured by the IMD Digital Competitiveness Index. The model is estimated on annual data, 2012-2019.[6]

Table 2. Singapore: Panel Regression-Currency in Circulation

	Dependent Variable
	cic
GDP_pc	-2.26***
	(0.58)
Fci	0.02
	(0.14)
Int	0.004
	(0.02)
Age	0.80***
	(0.18)
Dgt	-1.52
	(5.61)
Observations	130
R2	0.34
Adjusted R2	0.19
F Statistic	10.77*** (df=5; 106)

Note: **p<0.1; **p<0.05; ***p<0.01

9. The regression results are broadly consistent with economic priors. The average age of the population is positively related to the demand for cash. The total demand for cash is also inversely related to GDP per capita. The interest rate (the cost of holding cash), digitalization across countries and the measure of macroeconomic uncertainty are not significant. This is consistent with the results in Bech et al (2018). The model can be extended to include small and large denomination bills, ATM density, consumption share of GDP, and tax evasion.

C. Policies to Decrease Cash Use and Foster E-payments

10. Wider adoption of e-payments could enhance productivity. E-payments are a convenient and efficient alternative to the use of cash and cheques. As efficient and secure e-payment alternatives become available there are opportunities for businesses to enhance productivity (e.g. reducing costly cash processing, faster payments and gaining data on payment behaviors). Other countries, such as Sweden, are further along in their move away from cash through payment system innovation and efficient peer-to-peer payments.

11. Government policies could foster e-payments use, while ensuring financial inclusion, competition, and innovation. Cash use remains entrenched in Singapore as wider use of e-payments may have been hindered by the number of different e-payment solutions and interoperability concerns. Also, many older people may lack the basic financial and IT skills to transact digitally. To harvest potential productivity benefits, the payment systems of the future in Singapore need to promote interoperability, efficiency and security, and access across market

[6] Data sources are as follows: currency in circulation, GDP, and GDP per capita are from the BIS CPMI database; short-term interest rates are from BIS and IMF International Financial Statistics; data on the median age are from the World Bank and Singapore Statistics; the FCI is computed using the methodology and data sources in IMF (2017); and the digitalization proxy is from the IMD Digital Competitiveness Index.

segments and demographics. To further decrease the use of cash, policies to enhance e-payment infrastructure could specifically include:

- **Building an inclusive e-payment infrastructure.** Older and poorer part of the population often have less access to e-payment services. To foster greater use of e-payments, it will be imperative to ensure basic digital skills and enhance financial literacy in these segments of the population. Building on the strong increase in the use of e-payments, MAS launched a public awareness campaign in March 2021, "E-Pay Okay", with aim to promote further growth, highlighting the safe, simple and speedy characteristics of e-payments solutions. The authorities have also introduced a "Seniors Go Digital" program that helps senior citizens learn basic digital skills, including how to use e-payments solutions. Some countries are exploring Central Bank Digital Currencies (CBDC) partly to ensure that e-payment services are available to segments of the population which may be underserved by established banks (Armelius et al, 2020 *a* and *b*).
- **Introducing common standards to provide interoperability and competition**. The Singapore payments infrastructure has been characterized by a number of non-interoperable systems and this has slowed the use of e-payments (KPMG, 2016). E-payments are subject to strong network effects and subject to natural monopoly. In this context, it will be important to let users carry their data across various platforms, providing interoperability, while adequately protecting data privacy. This "public good" of common standards can foster private sector competition and consumer choice (see Adrian, 2020). To explore the benefits of distributed ledger technologies, MAS launched Project Ubin in 2016. Under this project, MAS has collaborated closely with industry partners to explore the development of blockchain-based settlement systems and it culminated in the development of a blockchain-based prototype for digital multi-currency settlement.
- **Collaboration among policy makers, both domestically and internationally**. Digital technologies in payment systems are a cross-cutting concern, spanning from competition to consumer protection. MAS partners with other government agencies such as the Infocomm Media Development Authority (IMDA) and Enterprise Singapore (ESG) to encourage e-payments across specific merchant segments (e.g. small and medium-sized enterprises). As a trade and finance hub, initiatives in Singapore will likely affect users in other countries, raising the importance of cross-border policy collaboration. In this vein, MAS is pioneering a link with the Bank of Thailand to respective national retail fast payments (launched at end-April 2021). The system will allow to reduce time for international transfers to minutes instead of the current one-to-two days. Building on the insights from Project Ubin, a joint project by the BIS Innovation Hub and the MAS plans to work with central banks, financial institutions, and technology partners with the vision of enhancing cross-border payments, including transactions using multi-CBDCs.[7]

[7] See IMF (2020) for a discussion of cross-border macrofinancial effects of payment system innovation.

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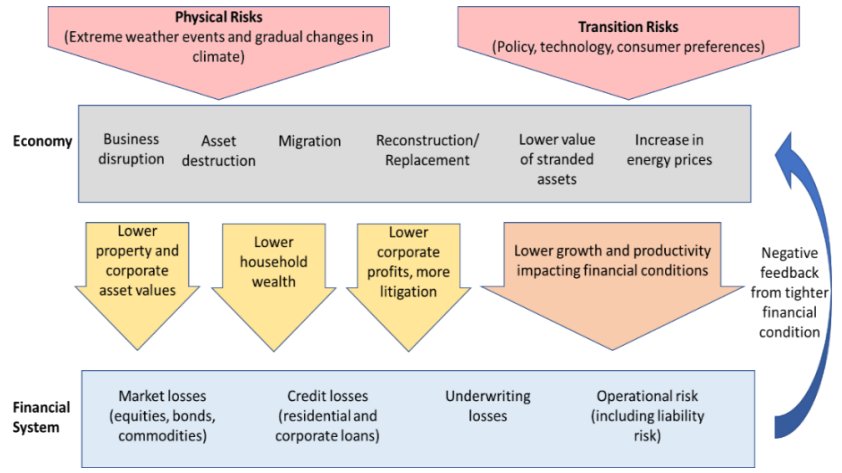
GREEN FINANCE IN SINGAPORE[1]

Policymakers, investors, and firms in Singapore have started to act on climate change risks, including the mainstreaming of green financial solutions. There are increasing efforts by both regulators and market participants to integrate climate considerations in risk assessments, financing decisions and disclosure practices. While the green finance market is still modest in absolute value, it is growing fast with Singapore accounting for about half of cumulative ASEAN green debt issuances.

A. Green Finance Globally

1. Green finance is gaining traction globally. Environmental considerations in relation to finance are part of a broader set of considerations that also include social and governance aspects. These themes are summarized under the terms sustainable finance and ESG (Environmental, Social, Governance). ESG considerations are being increasingly integrated in the decision-making of investors, firms and policymakers. The environmental aspect is largely driven by rising concerns about climate-related physical risks (losses as climate-related changes disrupt economic activity and destroy capital) as well as growing awareness of transition risks (losses resulting from a shift toward a lower-carbon economy). Physical and transition risks from climate change can result in large, correlated, and non-linear losses, materially impacting the economy and the financial system (Figure 1).[2]

Figure 1. Physical and Transition Risks from Climate Change



Sources: Network for Greening the Financial System, IMF Global Financial Stability Report October 2019.

2. The financial system plays a fundamental role in mobilizing the resources needed for investments in climate mitigation and adaptation. While policymakers implement policies to

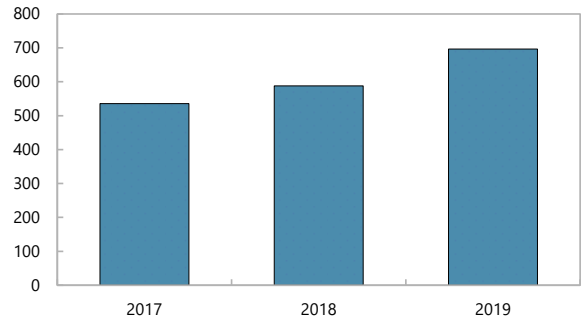
[1] Prepared by Jochen Markus Schmittmann (APD), Han Teng Chua, and Natalia Novikova (Singapore Resident Representative Office).

[2] See the October 2019 *Global Financial Stability Report* for an overview of sustainable finance globally.

price in externalities, for example through carbon taxes, and provide incentives for the transition to a low-carbon economy, the financial system can also help achieve these goals. Investors can play a crucial role by allocating capital toward lower carbon activities, engaging with company management, advocating for low-carbon strategies as investor activists, and lending to firms that are committed towards sustainability.

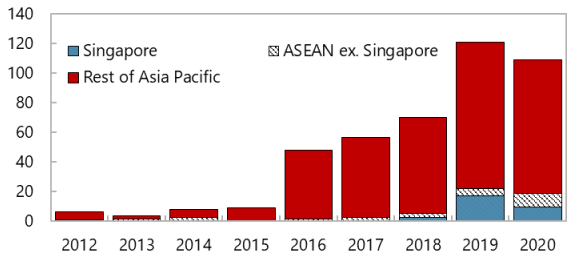
3. Sustainable investing and green debt issuances have grown rapidly over the past few years. The Global Sustainable Investment Alliance (GSIA) estimates that at least US$30.7 trillion of funds were held in sustainable or green investments in early 2018, up by 34 percent from 2016 in the five largest markets.[3] As of 2019, ESG assets under management in Singapore grew to about US$700 billion (about 28 percent of total) (Figure 2). Global green debt issuances meanwhile grew cumulatively to US$2.2 trillion in 2020, compared with around US$31 billion in 2012. Over the same period, green debt issued in Asia Pacific (APAC) and ASEAN increased to around US$433 billion and US$56 billion, respectively, from US$6 billion and US$1 billion. Singapore accounted for 55 percent of ASEAN issuances, and its share relative to global green debt issuances stood at around 1.4 percent in 2020 (Figure 3).

Figure 2. Assets of ESG AUM in Singapore
(Billions of US dollars)



Sources: MAS Asset Management Survey 2019, IMF staff calculation

Figure 3. APAC Sustainable Debt Total Issuances
(Billions of US dollars)



Sources: BloombergNEF, IMF staff calculation
Note: Issuances include green bonds, green loans, social bonds, sustainability bond, sustainability-linked bond, sustainability-linked loan based on domicile of issuance

B. Sustainable Finance Initiatives and Regulatory Support

4. The Monetary Authority of Singapore (MAS) is promoting robust environmental risk management among financial institutions, supporting the development of global sustainability reporting standards for securities issuers, and leading efforts to make Singapore a green finance hub. MAS acknowledges the financial stability implications of climate change and supports the development of green finance, both through its Green Finance Action Plan (Table 1), which was announced in November 2019, and participation in various international fora.

[3] In the absence of a uniform global definition, in its biannual reports the GSIA uses an inclusive definition of sustainable investing, without drawing distinctions between this and related terms such as responsible investing and socially responsible investing. The assessment covers the US, Europe, Japan, Australia and New Zealand.

5. MAS issued the Guidelines on Environmental Risk Management for financial institutions (FIs) in December 2020.[4] The guidelines cover banks, insurers, and asset managers and aim at building resilience in the financial sector and mobilizing the financial sector to support the transition to a more environmentally sustainable economy. The guidelines set expectations for FIs to (i) establish a framework and build capacity to identify, measure, monitor and manage environmental risks beyond just climate change, including through the use of scenario analysis and stress testing; (ii) engage with riskier customers and investee firms to transit to more sustainable business practices over time; and (iii) disclose their approach to environmental risk management in accordance with well-regarded international reporting frameworks, such as recommendations by the Task Force on Climate-related Financial Disclosures (TCFD). The Guidelines are complemented by a handbook on implementing environmental risk management for banks, insurers, and asset managers, launched in January 2021 by the MAS-convened Green Finance Industry Taskforce (GFIT).

6. In addition, MAS has started to attune the industry towards stress tests for climate change-related risks. In 2018, MAS subjected insurers to a scenario featuring extreme flooding, with insurers having to consider the impact of higher claims on their balance sheets arising from damage to insured properties. By end-2022, MAS will incorporate a broader range of climate risks in stress tests for the financial industry. This will help MAS and the industry to enhance awareness of the economic and financial implications of such risks and encourage the collaborative development of relevant capabilities.

7. To encourage green debt issuance, MAS has introduced grant schemes to help defray associated costs. In 2017, MAS launched the Sustainable Bond Grant, which subsidizes the cost of external reviews for green, social and sustainability bonds. By end 2020, about S$11 billion in green, social and sustainability bonds had been issued in Singapore. The scope of the grant was expanded in 2020 to include sustainability-linked bonds. In 2018, MAS introduced a grant scheme to subsidize the issuance of insurance-linked securities, which could be catered towards all forms of risks including natural catastrophes. In 2020, MAS launched a grant scheme for green and sustainability-linked loans. This scheme aims to support corporates of all sizes and sectors to access green finance, by defraying the expenses of engaging independent service providers to validate the green and sustainability credentials of the loan.

8. In managing official foreign reserves MAS aims to build a climate–resilient portfolio. Analysis of possible investment implications of climate change, conducted by MAS in partnership with GIC, showed that the negative impacts are mitigated by the well-diversified portfolio with fixed income instruments accounting for the largest allocation. In order to build a climate-resilient portfolio, MAS is implementing portfolio adjustments to mitigate climate risk and support the greening of the economy. Actions to mitigate climate risk include integration of ESG in the investment process, adoption of an overlay strategy within equity assets via benchmark customization, and exclusion of companies susceptible to a sharp permanent drop in value in the

[4] The guidelines recognize that FI's board and senior management play a critical role in incorporating environmental considerations into risk appetite, strategies and business plans, and set the expectation that they should oversee and steer the organization's response to international agreements (e.g. the Paris Agreement) and other national policies.

transition to a low-carbon economy. In addition, to grow green funds, MAS has announced a US$2 billion Green Investments Program (GIP). The GIP places investments with asset managers who have a good track record of sustainability investing and stewardship and are committed to deepening green finance capabilities in Singapore.

9. To build green finance knowledge and capabilities, MAS is anchoring centers of excellence to spearhead research and training. MAS facilitated the setup of the first center, the Singapore Green Finance Centre, in October 2020. In March 2021, the Sustainable Finance Institute Asia (SFIA), a new independent research and capacity building institution focused on sustainable finance policy recommendation and implementation in Asia, also established its headquarters in Singapore. MAS is also providing incentives to anchor sustainability teams of FIs, as well as external reviewers and rating agencies that assess and certify green financing instruments to support capital flows to sustainable causes.

10. The government has identified green infrastructure projects worth S$19 billion (US$14 billion) for which it plans to raise funds through green bonds. The issuance will be spread over several years and will serve as a reference for Singapore's green finance market and support market liquidity.

11. MAS actively participates in several international fora, cooperating with other global regulators on green finance. MAS is a founding member of the Network for Greening the Financial System (NGFS).[5] At the NGFS, MAS is leading a workstream on micro-prudential practices, which provides guidance on incorporating climate and environmental risks into prudential supervision. It is also a member of the Sustainable Insurance Forum (SIF), which closely partners with the United Nations and International Association of Insurance Supervisors. MAS is also an active member of the International Organization of Securities Commissions (IOSCO) Sustainable Finance Taskforce (STF), which has established a Task Force on Sustainable Finance with an aim of addressing issues concerning sustainability-related disclosures and investor protection. Singapore joined the International Platform on Sustainable Finance (IPSF) in June 2020, which comprises government ministries and central banks from countries across regions, and seeks to enhance international coordination on environmental taxonomies, disclosures and green standards and labels, to mobilize private capital towards environmentally sustainable investments.

12. Private sector initiatives focus on standards and guidelines. The Association of Banks in Singapore (ABS) has published guidelines to support more transparent ESG disclosures and define minimum standards on responsible financing practices to be integrated into the business models of member banks and FIs. The Singapore Exchange (SGX) introduced mandatory sustainability reporting requirements for its listed entities for financial years ending on or after 31 Dec 2017, with

[5] NGFS aims to enhance the role of the financial system to manage risks, and to mobilize capital for green and low-carbon investments in the broader context of environmentally sustainable development.

guidelines to aid listed entities in their sustainability reporting on 5 primary components[6], including material ESG factors. In early 2021, the GFIT launched a public consultation of Singapore-based financial institutions on a taxonomy to identify activities that can be considered green or transitioning towards green. In May 2021, Singapore announced a carbon exchange to trade carbon offsets, Climate Impact X (CIX).[7]

Table 1. Singapore: MAS' Green Finance Action Plan—Selected Initiatives

Initiatives	Description
Building Financial System Resilience to Environmental Risks	
Environmental Risk Management Guidelines	The guidelines set standards for financial institutions (banks, asset managers and insurers) on governance, risk management and disclosures of environmental risk. Issued in December 2020.
Stress Tests for Climate-related Risks	In 2018, MAS subjected insurers to a scenario featuring extreme flooding. By end-2022, MAS will incorporate a broader range of climate risks in stress tests for the financial industry.
Developing Green Finance Solutions and Markets	
Green and Sustainability-Linked Loan Grant Scheme	The scheme supports corporates of all sizes and sectors to access green financing, by defraying 100 percent of the expenses of engaging independent service providers to develop green and sustainability frameworks and targets, obtain external reviews, and report on the sustainability impact of the loan, capped at S$100,000 per loan. It also supports banks in developing green and sustainability-linked loan frameworks by defraying up to 90 percent of the costs, capped at S$180,000 per loan, incurred by banks to engage these service providers to develop frameworks, obtain external reviews, and report on the allocated proceeds of loans originated under the framework. Launched in 2020.
Sustainable Bond Grant Scheme	The grant scheme has catalyzed the start of the green, social and sustainability bond markets in Singapore, by defraying 100 percent of the cost of obtaining a pre-and post-issuance external review for green, social, sustainability and sustainability-linked bonds, subject to a cap of S$100,000. Introduced in 2017 and upgraded in 2020 to cover sustainability-linked bonds.
Insurance-linked Securities (ILS) Grant Scheme	The grant funds up to 100 percent of the upfront issuance costs of ILS bond in Singapore. Introduced in 2018 and valid until December 2022.
Green Investments Program	Under the US$2 billion program launched in 2019, funds are placed to public market investment strategies, which have a strong green focus and with asset managers who are committed to deepening green finance activities and capabilities in Singapore. US$100 million has been placed in the Bank for International Settlements' Green Bond Investment Pool (GBIP).
Green Finance Capabilities	MAS supports the establishment of financial institutions' sustainability teams in Singapore, as well as external reviewers and rating agencies that assess and certify green financing instruments. MAS is also working to anchor Centers of Excellence in Singapore to contribute to drive Asia-focused research and training in green finance.
Green FinTech	MAS has earmarked S$50 million out of the Financial Sector Technology Innovation Scheme (FSTI) to support Green FinTech solutions.

Source: MAS.

[6] The five primary components are: (i) material ESG factors, (ii) policies, practices, and performance, (iii) targets, (iv) sustainability reporting framework, and (v) board statement. SGX-listed issuers must report on these 5 primary components on a comply or explain basis.

[7] CIX is a voluntary carbon market backed by DBS, Temasek Holdings Pte Ltd., Singapore Exchange Ltd. and Standard Chartered Plc.

C. Singapore Banks and Environmental Sustainability

13. Singapore's largest domestic banks are taking steps to assess the financial impact of environmental risk. As methodologies to quantify and assess these risks are evolving, disclosures of such assessment are at a nascent stage. With regard to *transition risk,* DBS[8] and UOB,[9] have disclosed the assessment of climate-related risks through scenario analysis of carbon prices, while OCBC launched a pilot project focusing on carbon price as a key transition risk and pledged to release TCFD-aligned report in 2021. On *physical risk,* DBS in 2019 launched a pilot assessment of physical risk for a sample of customers using three climate change impact scenarios on the energy and mining and metals sectors. UOB intends to assess the impact of physical risks in 2022.

14. These banks are also increasingly incorporating sustainability and climate change considerations in their strategies. Singapore's domestic banks have adopted responsible financing practices (Table 2) based on guidelines by the ABS and have pledged to cease financing of new coal power plants. UOB has prohibited the project financing of greenfield thermal coal mines since 2019, while DBS committed in April 2021 to reach zero thermal coal exposure by 2039. More broadly, ESG considerations are incorporated in the banks' decision-making processes, from credit lending approvals and capital market activities to risk management and analysis. Banks have also developed green finance solutions. In 2018-2020, the banks have provided about US$25.5 billion green and sustainability-linked loans (Figure 5). They have provided green and sustainability-linked loans, particularly to local real estate developers, which are developing new properties with green certification. In addition, they are reducing their own carbon footprint. This increased focus on ESG is also reflected by two Singaporean banks adopting the Equator Principles,[10] rising mentions of 'climate change' and 'ESG' in the banks' annual and sustainability reports (Figure 4) and adoption of green/ sustainable bond frameworks.

D. Nascent but Fast-Growing Sustainable Finance Market

15. Sustainability became an integral part of investment strategies for many Singapore asset managers, including sovereign wealth funds. [11] The number of Singaporean asset manager

[8] DBS have been reporting under TCFD since 2018. DBS' analysis of transition risks includes a combination of: (i) bottom-up assessment assuming a carbon price increase for a sample of listed companies in carbon-intensive sectors (about 9.6 percent of the Institutional Banking Group's total exposure, covering 60 percent of companies in five sectors); (ii) a top-down, portfolio level approach for the rest of the entire corporate lending portfolio. Under the first approach, DBS found that credit ratings of 40 out of over 400 customers would be reduced by at least one notch.

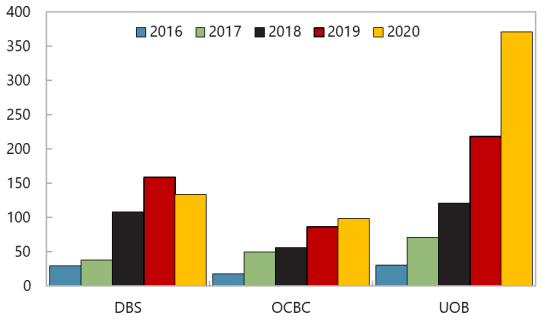
[9] Based on a sample of large corporates and SMEs covering about 5 percent of total non-bank loans, UOB found that under a high carbon price scenario credit rating of companies included in the sample would deteriorate by two notches. Most carbon-intensive sectors like building materials would be hit the most. A similar assessment for the real estate portfolio (about 6 percent of non-bank loans) suggested negligible deterioration of credit ratings. Overall, while acknowledging the limitations of the methodology and data availability, UOB concluded that the resulting credit risk for the bank would be immaterial.

[10] The Equator Principles is a risk management framework adopted by FIs for determining, assessing and managing environmental and social risks in large-scale development projects.

[11] Temasek Holdings aimed at closing 2020 with carbon neutrality and committed to halve the net greenhouse gas emissions of its portfolio by 2030. GIC is taking a long-term and holistic approach towards sustainability. It is incorporating climate change into its portfolio by evaluating the way long-term capital market assumptions are affected by climate change drivers and under different scenarios.

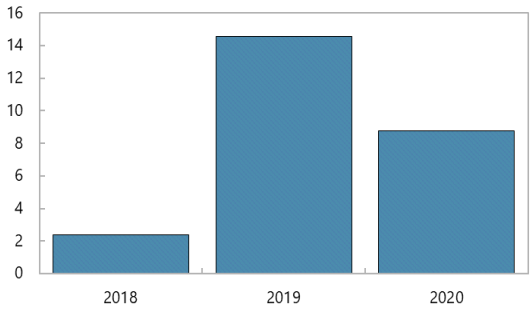
signatories to the United Nations Principles for Responsible Investment (UN PRI) has risen quickly (Figure 6). Total assets of ESG-listed funds available in Singapore stood at around US$120 billion as at end-2020, with equity funds accounting for more than 80 percent of total assets (Figure 7). ESG fixed income funds in Singapore are small at around 10 percent but are benefitting from an increased recognition of the relevance of ESG in fixed income.

Figure 4. Singapore Local Banks: Emphasis on Sustainability
(Number of times 'climate change' and 'ESG' were mentioned in the annual and sustainability reports)



Sources: Annual Reports, Sustainability Reports, IMF staff calculations

Figure 5. Green and Sustainability-Linked Loans Total Issuances
(US$ billion)



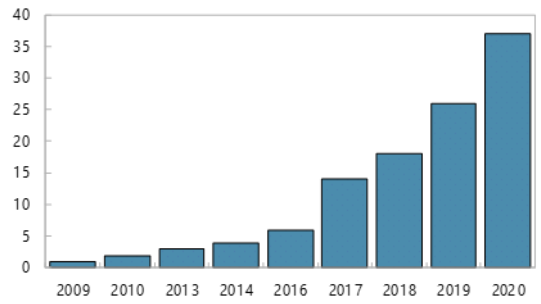
Sources: BloombergNEF, IMF staff calculation

Table 2. Singapore: Responsible Financing Approaches of Singapore's Three Local Banks

Bank	Responsible Financing Approach
DBS	1) Group Core Credit Risk Policy incorporates principles and approaches to managing ESG issues in lending practices. Due diligence (ESG risk assessment) is primarily carried out by relationship managers, before being reviewed by credit risk managers as part of the credit approval process . 2) Sector Lending Guides were developed for agricultural commodities, palm oil, chemicals, oil & gas, mining & metals, power generation, infrastructure, animal husbandry & feed, apparel, footwear & textiles. 3) Financing is prohibited for activities or projects that are in violation of local or national laws, or involve certain activities e.g. forced or child labor, illegal logging, military goods production.
OCBC	1) Integrates ESG Risk Assessment Framework in lending and capital markets activities from relationship managers to credit approving officers and audit. 2) Developed exclusion lists and sector policies (agriculture & forestry, chemicals, defense, energy, infrastructure, metals & mining, waste management) 3) Provide range of green financing solutions to key focus industries (e.g. renewable energy, green buildings, water management) that are linked to focus Sustainable Development Goals.
UOB	1) ESG matters such as climate change risks and opportunities are integrated into the risk management approach and apply to borrowers for wholesale banking and capital market activities. 2) Borrowers in eight ESG-sensitive industries (agriculture, metals & mining, chemical, infrastructure, forestry, defense, energy, waste management) are subject to enhanced due diligence. 3) Engage with borrowers proactively by working with them to improve their ESG practices.

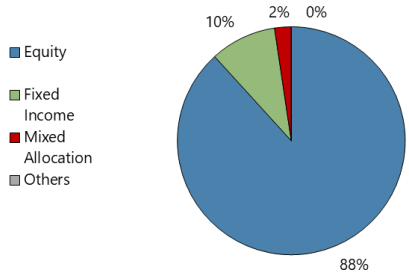
Sources: Banks' annual and sustainability reports.

Figure 6. Singapore Asset Manager Signatories to United Nations Principles for Responsible Investment
(Cumulative Number; 2009-2020)



Sources: UN PRI, IMF staff calculation

Figure 7. ESG-Listed Funds Available in Singapore Asset Class Breakdown
(Percent of Total Assets)



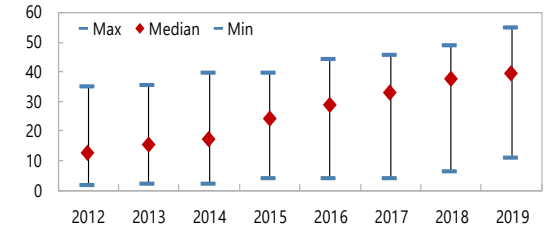
Sources: Bloomberg, IMF staff calculation
Note: Breakdown based on ESG-listed funds available in Singapore as of end-2020.

16. Environmental corporate disclosures by listed companies in Singapore have improved in recent years. All SGX-listed companies must prepare a yearly sustainability report (¶12). The compliance rate is high with 99.5 percent of those that are required to report by December 31, 2020 issuing sustainability reports, either as standalone reports or part of their annual reports. The treatment of climate change as a material factor has improved but use of reporting frameworks specifically adapted to climate change remains small. One third of listed issuers mentioned climate change as material in their 2020 reports, up from around 6.5 percent in 2018. However, only 2 percent of listed issuers used climate change specific reporting frameworks by the TCFD, Carbon Disclosure Project or Science Based Targets Initiative (SGX, 2019, 2021). Globally and including Singapore, a lack of consistent methodologies and reporting standards makes it challenging for investors to adopt ESG considerations in their investment process (IMF, 2019). SGX is looking to include recommendations by the TCFD within its guidelines to help listed companies with climate-related financial disclosures. The median Bloomberg Environmental Disclosure Score[12] of the Straits Times Index constituents rose to 40 in 2019 from 12 in 2012 (Figure 8). Singaporean corporates' environmental disclosures are comparable to US levels but below EU peers (Figure 9).

17. Singapore's green bond issuance and trading has further room for growth. Green bonds listed and traded on the SGX are expanding rapidly but are lagging behind European peers. The cumulative number of green bond listings on the SGX grew to 103 valued at US$44 billion in 2020 from just one listing valued at US$500 million in 2013. The number and value of green bond listings are however small in comparison to those on the Frankfurt and Luxembourg stock exchanges (Figure 10). Green bonds listed on the SGX were largely denominated in US dollars and issued by foreign entities mainly from Asia, but also from other regions. The average issuance size was about US$200-800 million (Figure 11).

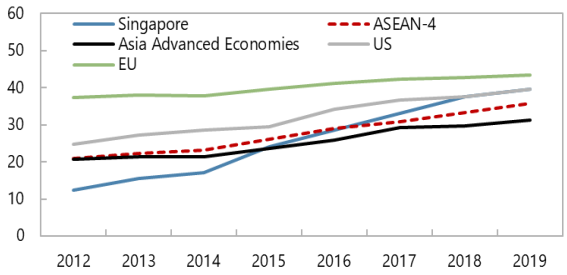
[12] The score measures the extent of a company's environmental disclosures. Firms that disclose every data point collected by Bloomberg have a score of 100. A score of 0 indicates no disclosure.

Figure 8. Environmental Disclosure by Companies listed on SGX
(Bloomberg Environmental Disclosure Score, Out of 100)



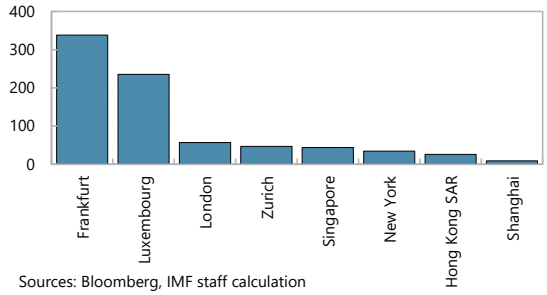
Sources: Bloomberg, IMF staff calculations
Note: (1) Environment disclosure score measures the extent of a company's environmental disclosure. Firms that disclose every data point collected by Bloomberg will have a score of 100.
(2) Calculations are based on companies trading on the Straits Times Index

Figure 9. Environmental Disclosure by Companies listed on SGX and Peers
(Median Bloomberg Environmental Disclosure Score, Out of 100)



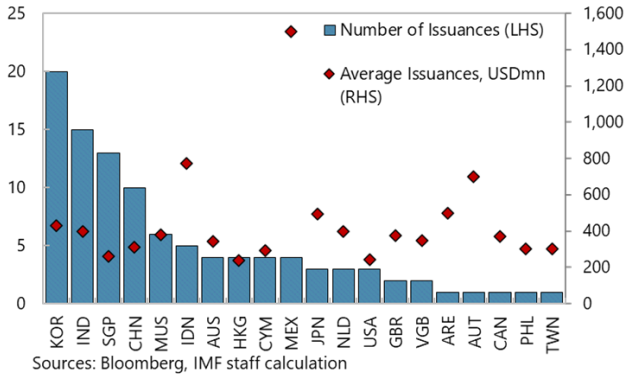
Sources: Bloomberg, IMF staff calculations
Note: Calculations are based on companies trading on each country's benchmark equity index and have disclosure scores across the years. ASEAN-4 and Asia Advanced Economies scores are average of the median of sample countries.

Figure 10. Cumulative Amount of Green Bonds Listed at Exchanges
(Billions of US dollars; 2012-2020)



Sources: Bloomberg, IMF staff calculation
Note: Includes all active and matured bonds. New York includes NYSE and Nasdaq.

Figure 11. Green Bonds Listed on SGX Breakdown by Economy of Domicile, 2012-2020
(Percent)

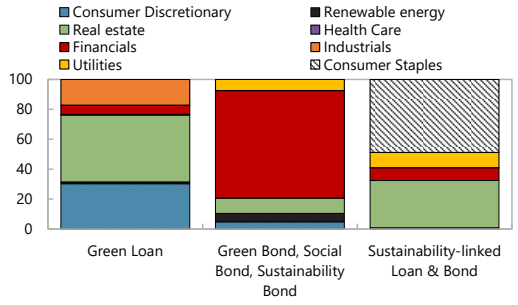


Sources: Bloomberg, IMF staff calculation

18. The sectoral coverage expanded overtime in all segments of green and sustainable finance. While financial institutions tend to rely more on securities funding, real estate projects are present in all types of funding.

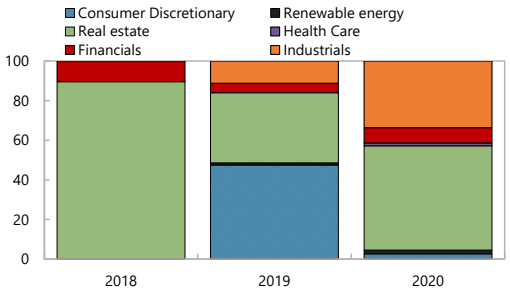
19. Singapore is also promoting innovative disaster risk insurance products to strengthen climate risk resilience in Asia. There have been 14 insurance-linked securities launched in Singapore. The first catastrophe bond (cat bonds) in Singapore was issued in February 2019 by Insurance Australia Group. Subsequently, two World Bank Philippines cat bonds were listed on the SGX (the first ever on SGX and on an Asian exchange) on November 2019. The World Bank bonds finance up to US$225 million of protection against earthquakes and cyclones in the Philippines over the next three years.

Figure 12. Singapore Sustainable Debt Issuance Industry Breakdown
(Percent of Total Issuances, 2017 to 2020)



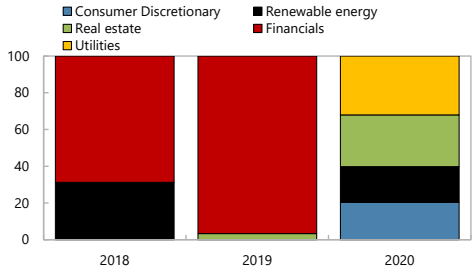
Sources: BloombergNEF, IMF staff calculation

Figure 13. Singapore Green Loans Issuance Industry Breakdown
(Percent of Total Issuances)



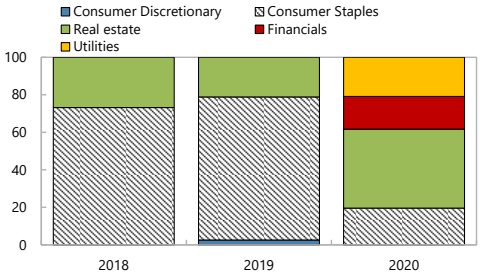
Sources: BloombergNEF, IMF staff calculation

Figure 14. Singapore Green, Social, and Sustainability Bond Issuance Industry Breakdown
(Percent of Total Issuances)



Sources: BloombergNEF, IMF staff calculation

Figure 15. Singapore Sustainability-Linked Loans and Bond Issuance Industry Breakdown
(Percent of Total Issuances)



Sources: BloombergNEF, IMF staff calculation

E. Conclusion

20. The growing green finance market provides an opportunity for Singapore to support climate-friendly capital allocation. As a well-developed financial hub, Singapore is already attracting a good proportion of green finance related flows in Asia. The MAS can facilitate these trends by enforcing prudent climate risk management and disclosure, while supporting the development of green and sustainable finance solutions. The private sector has a key role to play in shifting investment priorities, which require incorporating climate and sustainability considerations in its strategies.

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