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Macroeconomic Review

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April 2020

The *Macroeconomic Review* is published twice a year in conjunction with the release of the MAS Monetary Policy Statement.

The *Review* documents the Economic Policy Group's (EPG) analysis and assessment of macroeconomic developments in the Singapore economy, and shares with market participants, analysts and the wider public, the basis for the policy decisions conveyed in the Monetary Policy Statement. It also features in-depth studies undertaken by EPG, and invited guest contributors, on broader issues facing the Singapore economy.

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Abbreviations

ACU	Asian currency unit
ASEAN	Association of Southeast Asian Nations
BIS	Bank for International Settlements
COVID-19	coronavirus disease 2019
CPI	consumer price index
DBU	domestic banking unit
ECB	European Central Bank
EM	emerging market
EU	European Union
EPG	Economic Policy Group
F&B	food and beverage
FDI	foreign direct investment
GDP	gross domestic product
ICT	information and communications technology
IMF	International Monetary Fund
IT	information technology
m-o-m	month-on-month
NEA	Northeast Asian economies
NODX	non-oil domestic exports
OECD	Organisation for Economic Cooperation and Development
OPEC	Organization of the Petroleum Exporting Countries
PMI	purchasing managers' index
QE	quantitative easing
q-o-q	quarter-on-quarter
REIT	real estate investment trust
SA	seasonally adjusted
SAAR	seasonally adjusted annualised rate
SARS	Severe Acute Respiratory Syndrome
SME	small and medium enterprises
UN	United Nations
WHO	World Health Organization
y-o-y	year-on-year

Data used in the *Review* is drawn from the following official sources unless otherwise stated: Building and Construction Authority (BCA), Central Provident Fund Board (CPF), Singapore Department of Statistics (DOS), Enterprise Development Board (EDB), Enterprise Singapore (ESG), Infocomm Media Development Authority (IMDA), Land Transport Authority (LTA), Ministry of Finance (MOF), Ministry of Manpower (MOM), Ministry of National Development (MND), Maritime and Port Authority of Singapore (MPA), Ministry of Trade & Industry (MTI), Singapore Tourism Board (STB) and Urban Redevelopment Authority (URA).

Preface

In this issue of the *Review*, Special Feature A assesses the impact of the US-China trade conflict on regional and global patterns of electronics trade, focusing particularly on US demand for electronics goods produced by Asia's China-centric production network. We are grateful to Professor Amit Seru of the Graduate School of Business at Stanford University for contributing Special Feature B, which discusses the role of technological innovations and current regulatory frameworks in driving the rise of shadow banks and FinTech lenders, and outlines its policy implications. We also thank Professor Ivan Png and Dr Charmaine Tan of the National University of Singapore for Special Feature C, an empirical study of psychological factors—privacy and confidence in financial institutions—that could affect the use of cash around the world. We would also like to extend our appreciation to AMRO for collaborating with us on Box A, which explores whether policy reforms and infrastructure development have helped to attract foreign direct investment in the ASEAN-5 countries. Additionally, we would like to present Box B, which compares the Jobs Support Scheme announced in the FY2020 Budget with the wage cost reduction schemes that the Singapore government has rolled out in past economic downturns. Finally, we would like to thank Professor Peter Wilson for his assistance in editing the *Review*.

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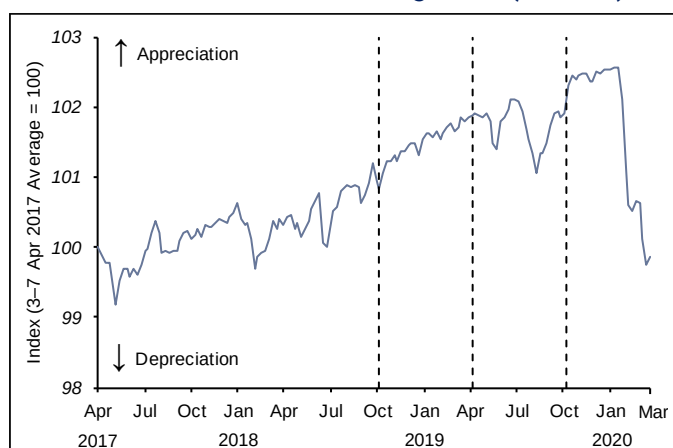
30 March 2020

Monetary Policy Statement

INTRODUCTION

1. In its October 2019 Monetary Policy Statement, MAS reduced slightly the rate of appreciation of the S\$NEER policy band. There was no change to the width of the policy band and the level at which it was centred. The measured adjustment to the policy stance was assessed to be appropriate given muted inflationary pressures.

Chart 1
S\$ Nominal Effective Exchange Rate (S\$NEER)



--- indicates last three releases of Monetary Policy Statement

2. Between October 2019 and late January this year, the S\$NEER hovered near the upper bound of the policy band amid broad-based US\$ weakness. Since then, the S\$NEER has depreciated in line with declining inflation and sharply weakening economic growth. The current level of the S\$NEER is slightly below the mid-point of the policy band.

3. The three-month S\$ SIBOR fell from 1.8% in October 2019 to around 1.0% as at late March, following the decline in the US\$ LIBOR during this period.

OUTLOOK

4. The COVID-19 pandemic has led to a severe contraction in economic activity both in Singapore and globally, due to the combination of supply chain disruptions, travel restrictions imposed in many countries and a sudden decline in demand. The Singapore economy will enter a recession this year, with GDP growth projected at -4 to -1%. Consequently, disinflationary pressures are expected to broaden, even as the prices of some imported items are likely to increase as a result of the disruptions in production and transport. MAS is thus lowering the 2020 forecast range for both MAS Core Inflation and CPI-All Items inflation to -1 to 0%.

Growth Backdrop and Outlook

5. Based on the *Advance Estimates* released by the Ministry of Trade and Industry on 26 March, the Singapore economy contracted by 2.2% year-on-year in Q1 2020, following the 1.0% expansion in the preceding quarter. On a quarter-on-quarter seasonally adjusted basis, GDP declined sharply by 10.6%, after expanding by 0.6% in Q4 2019.

6. The outbreak of COVID-19 domestically and abroad has weighed on a broad spectrum of economic activities. Travel-related industries, such as aviation and tourism, have been hardest hit. Consumer-facing sectors have been severely affected by social distancing measures and heightened uncertainty. Construction activity also declined in Q1, in part reflecting disruptions to the inflow of workers and raw materials. The manufacturing sector recorded its fourth consecutive quarter of contraction, with lacklustre performances across most segments except for the biomedical and precision engineering industries.

7. Looking ahead, global GDP growth is expected to stall or even contract in H1 2020, given the significant interruption to economic activity in most of Singapore's major trading partners. The ongoing wave of COVID-19 outbreaks will continue to dampen global growth beyond the first half of the year, even as China is showing signs of recovery to normalcy. Fiscal, monetary and regulatory support in a number of major economies will help to mitigate the economic fallout, but is unlikely to change this weak outlook. Overall, major uncertainty remains. The recovery in the global economy will depend on the epidemiological course of the pandemic and the efficacy of policy responses.

8. Against this backdrop, the Singapore economy is expected to contract in 2020. Activity will remain subdued in the travel-related and consumer-facing sectors until the pandemic is contained globally and in the region. Growth in the trade-related industries will be weighed down by the decline in external demand and supply chain disruptions, while modern services such as finance & insurance and information & communications will be affected by the general slowdown in business activity and investment.

9. At this juncture, Singapore's GDP growth is projected at -4 to -1%, which will result in a substantial widening of the negative output gap. The emergence of slack in domestic factor markets would lead to some disinflationary pressures in the economy.

Inflation Trends and Outlook

10. MAS Core Inflation, which excludes the costs of accommodation and private road transport, declined from 0.6% year-on-year in H2 2019 to an average of 0.1% in January–February 2020. This was partly due to a larger decline in retail goods prices, as well as government measures to reduce the costs of pre-school education and healthcare. Over the same period, CPI-All Items inflation rose slightly to 0.6%, reflecting a larger increase in private road transport costs and a turnaround in imputed rentals on owner-occupied accommodation.

11. External sources of inflation are likely to weaken in the near term amid the global downturn. In particular, benchmark oil prices fell sharply in March and are expected to stay low for an extended period. However, supply chain disruptions arising from worldwide measures to contain COVID-19 could put some temporary upward pressure on imported food prices. On the domestic front, a degree of labour market slack could emerge as firms pull back on their hiring plans, even as the scale of retrenchments is mitigated by the Jobs Support Scheme. The resident unemployment rate is expected to rise and wage growth ease. Meanwhile, non-labour costs such as retail rents should stay subdued. Softer labour market conditions and weak consumer sentiment will keep cost pressures in check and cap their pass-through to consumer prices. The government's decision to freeze all its fees and charges for a year will further restrain inflation.

12. Within the non-core components of the CPI, rentals are expected to be broadly flat as demand for accommodation eases in line with the reduced inflow of foreign workers. Car prices are likely to be largely unchanged as households hold back on expenditure that require large financial outlays.

13. Given these factors, both MAS Core Inflation and CPI-All Items inflation are expected to average between -1 and 0% in 2020.

MONETARY POLICY

14. The Singapore economy will contract this year. GDP growth will eventually recover following the abrupt downshift in the level of activity, but there is significant uncertainty over the depth and duration of this recession. MAS Core Inflation is likely to remain below its historical average in the near and medium term.

15. With the deterioration in macroeconomic conditions and expectations of a weaker outlook, the S\$NEER has depreciated to a level slightly below the mid-point of the policy band.

16. MAS will adopt a zero per cent per annum rate of appreciation of the policy band starting at the prevailing level of the S\$NEER. There will be no change to the width of the policy band. This policy decision hence affirms the present level of the S\$NEER, as well as the width and zero per cent appreciation slope of the policy band going forward, thus providing stability to the trade-weighted exchange rate.

17. This stable monetary policy stance also reflects the primary role of fiscal policy in mitigating the economic impact of COVID-19. The Resilience Budget announced on 26 March, and the earlier Unity Budget, will help to preserve jobs, skills and firms' know-how and capabilities. MAS' money market operations will at the same time provide sufficient liquidity to the financial system. Monetary policy will complement these efforts and ensure price stability over the medium term.

18. MAS will continue to be vigilant over developments in the economy and financial markets, and stands ready to curb excessive volatility in the S\$NEER.

1 The International Economy

- The COVID-19 pandemic has inflicted a substantial negative shock on the world economy. Global GDP is projected to contract more sharply in 2020 than during the Global Financial Crisis.
 - Alongside stringent public health measures, national authorities have swiftly drawn up wide-ranging policy responses on the fiscal, monetary and liquidity fronts. Policy support cannot avert a contraction in the near term, but it will alleviate the economic impact of the shock on households and businesses in the longer term.
 - In the baseline scenario, the global economy is projected to pick up from Q3 2020 as mobility restrictions are gradually eased and policy loosening takes effect, attaining an above-trend growth rate in 2021. However, global output by end-2021 is still anticipated to be below the level projected before the COVID-19 outbreak.
 - The transmission and incidence of the virus poses a significant downside risk to the projections. Any recurrence of outbreaks later this year that requires renewed social distancing measures would exert a more prolonged and severe drag on the global economy.
-

1.1 Global Economy

The COVID-19 outbreak has inflicted a substantial negative shock on the global economy. The disease was first identified in China in late 2019 and has since become a global pandemic, with more than 2.9 million cases and at least 200,000 deaths recorded as of late-April.¹ Governments in countries experiencing outbreaks have implemented social distancing measures and restrictions on individuals' movement in order to contain the spread of the disease and manage the load on health systems. The stringency of public health measures across countries (weighted by their shares in Singapore's non-oil domestic exports) has more than doubled since end-January (**Chart 1.1**). The average prevailing level of restrictions across Singapore's trade partners is now roughly equivalent to a generalised lockdown.

The public health measures taken to combat the virus have inevitably caused severe and widespread economic disruption, as they render a whole spectrum of economic activity either impossible or much more difficult to carry out. By restricting the movement of people, social distancing measures curb the consumption of certain types of services, such as dining at restaurants and music concerts, which constitute a significant share of consumer expenditure in higher income economies. At the same time, the measures temporarily reduce the labour supply in the economy, interfering with production. In the US, lockdown orders are estimated to have shut down about one-third of the economy, with lesser degrees of disruption in the remaining two-thirds. A simple approximation indicates that one week of

¹ Data is sourced from Johns Hopkins University.

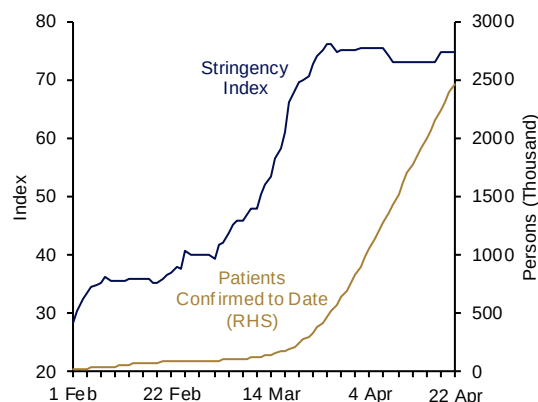
restrictions, affecting sectors of the US economy according to this profile, subtracts about 0.8 percentage points from annual US GDP.

The economic impact was first seen in China, where broad movement restrictions were put in place in mid-January this year. China's GDP contracted by 6.8% y-o-y in Q1 2020, the first such contraction since 1992, when quarterly data began. The country's output started to recover in March, after movement restrictions began to be lifted gradually. Industrial value added contracted by 1.1% y-o-y in March, after plunging by 13.5% y-o-y in the Jan–Feb period (**Chart 1.2**).

At this point, other major economies were beginning to see an impact as governments progressively implemented containment measures in response to their own domestic outbreaks. Early data suggests that the effects were both immediate and severe: the global composite PMI fell sharply to 39.4 in March (**Chart 1.3**), the weakest reading since February 2009. Flash PMIs in April point to further deteriorations in the Eurozone, Japan and the US, with their services PMI at record lows. There have been large-scale job losses in the US, with initial jobless claims totalling 26.5 million over the five weeks since the containment measures started in mid-March (**Chart 1.4**), by far the largest volume of claims since the data began in 1967.

Chart 1.1 Stricter containment measures have been implemented as COVID-19 cases increased

Stringency index vs total confirmed cases

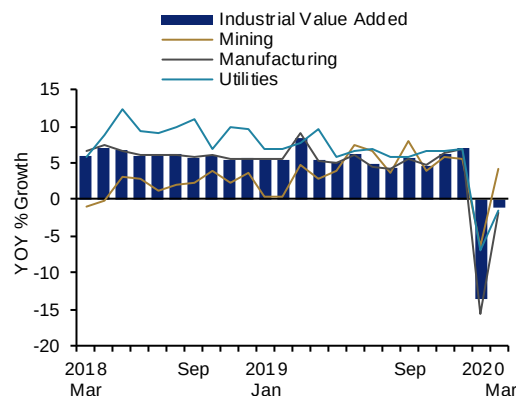


Source: Oxford University Blavatnik School of Government, WHO and EPG, MAS estimates

Note: The index is calculated by weighting each economy's overall measure of outbreak containment stringency by its weight in Singapore's NODX. Countries/economies included in the index are Australia, China, Eurozone, Hong Kong SAR, India, Indonesia, Japan, Malaysia, the Philippines, South Korea, Taiwan, Thailand, US and Vietnam.

Chart 1.2 China's industrial activity showed signs of gradual recovery in March

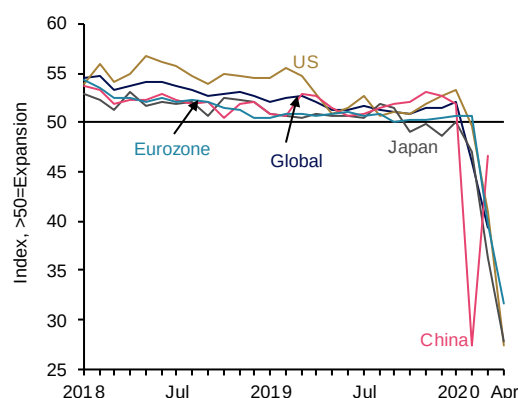
Year-on-year growth in China's industrial value added



Source: National Bureau of Statistics

Chart 1.3 The global composite PMI fell sharply in March alongside declining national PMIs

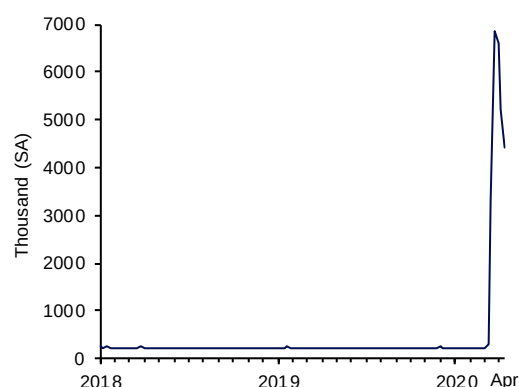
Composite PMIs



Source: J.P. Morgan

Chart 1.4 The contraction in US activity has been transmitted to its labour market

US weekly initial jobless claims



Source: US Department of Labor

Note: An initial claim is a claim filed by an unemployed individual after a separation from an employer. As part of the claim, the individual's eligibility for unemployment insurance is assessed.

Policy responses worldwide have been swift and substantial

Confronted with the size of the negative shock from the pandemic, governments around the world have responded innovatively, rapidly and on a large scale. Central banks in most of the major economies have reduced policy rates to their effective lower bounds, or close to them, and many have restarted quantitative easing (QE) programmes. For instance, the US Federal Reserve slashed its policy rate to zero in March and announced unlimited purchases of Treasuries and agency mortgage-backed securities. The ECB has also pledged to buy private and public sector securities under its €750 billion Pandemic Emergency Purchase Programme, while the Bank of Japan will increase its purchases of government and corporate bonds, commercial paper, J-REITs and exchange-traded funds. Nevertheless, monetary easing and liquidity provision have failed to prevent a sharp tightening in global financial conditions (**Chart 1.5**), as extreme economic uncertainty triggered a rush to safety. Global equity markets have weakened sharply in 2020, notwithstanding a partial rebound in April. Credit spreads have also widened significantly.

Fiscal policy in almost all affected countries has been eased substantially. Excluding lending guarantee packages, the large scale of fiscal support being announced suggests a NODX-weighted global fiscal impulse of more than 4.0% in 2020, well in excess of the 2.0% seen in 2009 (**Chart 1.6**).² The immediate fiscal response has focused on providing resources for the public health response to the pandemic. Governments have also introduced targeted temporary measures, including cash transfers, wage subsidies, tax rebates and enhanced social safety nets. Liquidity support measures, such as loans or loan guarantees to businesses, will also have a fiscal cost. Some governments, such as China, Germany, Hong Kong, Japan, and the ASEAN-5, plan to implement broader fiscal stimulus, including public investment, to support the recovery once the pandemic has been contained.³

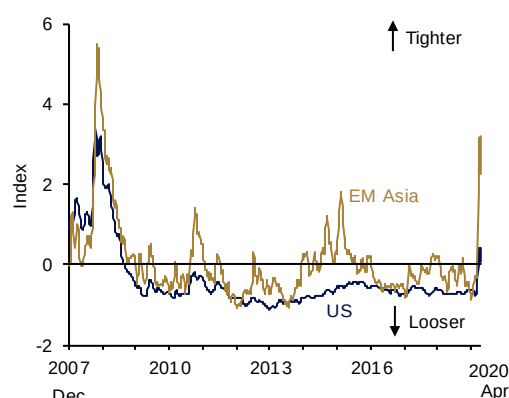
² Arend Kapteyn, Bhanu Baweja, Alexey Ostapchuk, Haojiang Zhao, Pierre Lafourcade and Alan Detmeister (2020), "Mulling Macro: The State of Global Stimulus", UBS, 19 March.

³ See Box A for a discussion on public infrastructure development in the ASEAN-5 and its potential benefits.

An output contraction induced by social distancing measures is unavoidable as countries attempt to flatten the infection incidence curve. Financial market frictions such as information asymmetries mean that private agents are unable to insure themselves against a sudden stop in revenues and cash flows. Moreover, the scale and severity of the shock has led to a sharp increase in uncertainty. However, macroeconomic policy loosening will mitigate the hit to business and household confidence and dampen the amplification of the initial shock through the financial channel.

Chart 1.5 Financial conditions have tightened significantly despite monetary easing measures

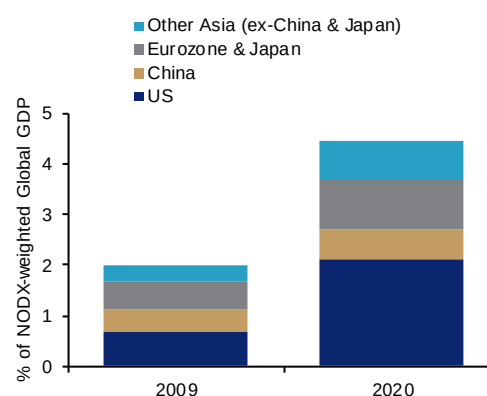
US and Emerging Asia financial conditions indices



Source: Chicago Fed and Citi Velocity

Chart 1.6 Announced fiscal measures suggest a global fiscal impulse of more than 4.0% in 2020

Estimated contributions to changes in the NODX-weighted cyclically adjusted global primary fiscal balance



Source: UBS and EPG, MAS estimates

Note: The fiscal impulse is measured by the cyclically adjusted primary balance, i.e., an estimate of the fiscal balance (excluding net interest payments) that would apply under current policies if output were equal to potential.

The baseline expectation is for the global economy to contract steeply before experiencing a partial recovery, but downside risks are significant

Assuming that shutdowns last between six to eight weeks in most major economies, global GDP (weighted by country shares in Singapore's NODX) is expected to fall sharply by 14.6% q-o-q SAAR in Q1 2020 and another 10.6% in Q2. For 2020 as a whole, the global economy is now projected to contract by 2.7% (**Table 1.1**), compared with 3.1% growth expected around the turn of the year, illustrating the extent of the negative shock. Such an outcome would be significantly weaker than the 0.7% growth registered in 2009 during the Global Financial Crisis.

In the baseline scenario, the pandemic is assumed to fade in the second half of 2020, with containment measures gradually lifted from the middle to end of Q2. Policy actions are presumed to be effective in preventing widespread firm bankruptcies, extended job losses, and system-wide financial strains. The relaxation of measures will then facilitate an immediate pick-up in activity. The global economy is projected to return to growth from Q3, with the recovery driving an above-trend expansion of 5.8% in 2021.

However, even after containment measures are unwound, economic activity is not likely to return to its pre-COVID-19 level in the short term. Households and businesses will have to cope with the rise in unemployment and weakened balance sheets, while the productive capacity of the economy will be impaired due to postponed investments and the loss of

human capital from job losses. Some output will be lost permanently rather than deferred, particularly for services that are consumed on a recurring or habitual basis, such as visits to restaurants or cinemas. The level of global GDP at end-2021 is expected to be 3.3% below what had been forecast before the advent of the COVID-19 shock.

The transmission and incidence of the virus is a significant source of uncertainty. Ferguson *et al.* (2020) have warned of a potential need for recurrent implementation of social distancing measures until the virus abates or a vaccine becomes available.⁴ Available data on the H1N1 pandemic of 1918 shows there was a second peak in cases about five months after the first surge (**Chart 1.7**). The unprecedented reach and severity of the current shock means that it is difficult to predict the impact on firm and household behaviour, adding to a lack of clarity over the economy's short to medium term adjustment path. The effect of the shock on the economy's long-term supply potential is also highly uncertain.

Table 1.1 The global growth outlook has worsened significantly

	QOQ SAAR (%)			Annual (%)		
	2019 Q4	2020 Q1*	2020 Q2*	2019	2020*	2021*
G3	-0.7	-5.0	-30.3	1.5	-5.8	3.8
Asia ex-Japan	4.3	-19.4	1.6	3.8	-1.2	6.6
ASEAN-5	4.0	-16.6	-15.3	4.5	-2.3	6.6
Global	2.8	-14.6	-10.6	3.1	-2.7	5.8

Source: CEIC and EPG, MAS estimates

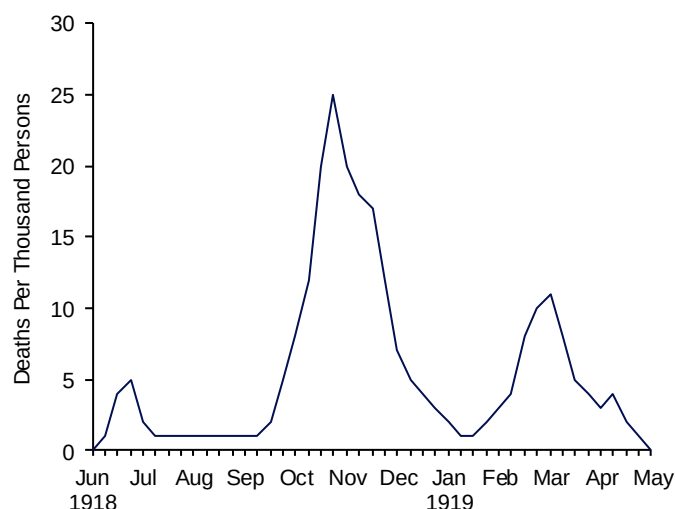
Note: The G3 grouping refers to the Eurozone, Japan and the US, while the ASEAN-5 includes Indonesia, Malaysia, the Philippines, Thailand and Vietnam. Asia ex-Japan includes China, Hong Kong SAR, India, South Korea, Taiwan and the ASEAN-5. All aggregates are weighted by country shares in Singapore's NODX.

* EPG, MAS forecasts

⁴ Neil M Ferguson, Daniel Laydon, Gemma Nedjati-Gilani, Natsuko Imai, Kylie Ainslie, Marc Baguelin, Sangeeta Bhatia, Adhiratha Boonyasiri, Zulma Cucunubá, Gina Cuomo-Dannenburg, Amy Dighe, Ilaria Dorigatti, Han Fu, Katy Gaythorpe, Will Green, Arran Hamlet, Wes Hinsley, Lucy C Okell, Sabine van Elsland, Hayley Thompson, Robert Verity, Erik Volz, Haowei Wang, Yuanrong Wang, Patrick GT Walker, Caroline Walters, Peter Winskill, Charles Whittaker, Christl A Donnelly, Steven Riley, Azra C Ghani (2020), "Impact of Non-pharmaceutical Interventions (NPIs) to Reduce COVID-19 Mortality and Healthcare Demand", Imperial College COVID-19 Response Team, 16 March.

Chart 1.7 The UK death rate from the 1918 pandemic peaked a second time after the main outbreak

UK deaths per thousand persons from influenza and pneumonia during the 1918 H1N1 pandemic



Source: Centers for Disease Control and Prevention

The COVID-19 shock is likely to be disinflationary in the short term

The COVID-19 shock will have an impact on inflation through both aggregate supply and demand channels. An adverse impact on supply can be seen in the deterioration of delivery times reported by purchasing managers: in March 2020, the supplier delivery times sub-component of the global manufacturing PMI declined to its lowest level since 2004, indicating substantial production disruptions. However, any upward pressure on prices from temporary supply bottlenecks is likely to be overwhelmed by the negative shock to demand ensuing from the hit to consumption and investment spending, as well as their knock-on effects on labour markets. Inflation expectations in the G3 have fallen, gauging from the breakeven inflation rates priced into government inflation-linked securities (**Chart 1.8**). Commodity prices have also weakened—the IMF non-fuel index fell 5.5% in March from January (**Chart 1.9**). Supply bottlenecks and short-term hoarding may lead to temporary spikes in food prices, but currently ample global stores of rice and other grains suggest a broader-based food price shock is unlikely. Oil prices have declined even more sharply year-to-date as cuts to global production have failed to match the decline in demand.⁵

Weaker commodity prices will have a greater disinflationary effect on headline inflation rates in Asia ex-Japan than in the G3, owing to the higher weight of commodities in the former's consumer baskets. Core inflation is likely to stay subdued in the region given the poor economic backdrop. Several regional central banks have revised their full-year inflation forecasts down, with part of the forecast ranges for Malaysia and Thailand in negative territory.

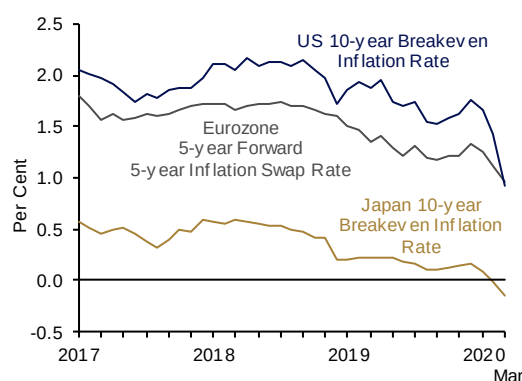
The longer-term outlook for global inflation is highly uncertain. On balance, it currently appears likely that the foregone demand from the COVID-19 crisis will outweigh any curtailment of supply capacity, and inflationary pressure will consequently remain weak.

⁵ Please see Chapter 3 for more details on oil price developments.

Global CPI inflation is expected to come in at 1.3% in 2020,⁶ down from 1.5% in 2019, before rising to 1.7% in 2021 in line with the recovery in economic activity. However, this remains below the average of 2.2% experienced in 2011–19.

Chart 1.8 Market-based measures suggest inflation expectations in the G3 have weakened

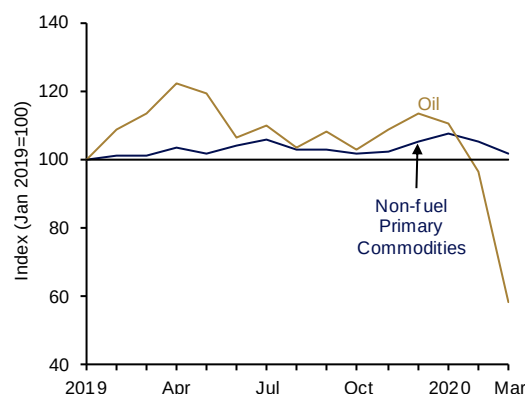
G3 breakeven inflation rates and forward swap rates



Source: J.P. Morgan

Chart 1.9 Commodity prices have fallen, with oil prices declining particularly sharply

IMF non-fuel primary commodities price index and Brent crude prices



Source: IMF

1.2 G3

Significant policy support will mitigate the impact of COVID-19

National and state governments in the Eurozone and the US had progressively tightened movement restrictions in March as the severity of the COVID-19 outbreak became apparent. These measures are estimated to have resulted in a near-total shutdown of sectors accounting for about one-third of output in their respective economies, with substantial disruption to other sectors. In the Eurozone, the pandemic has been most severe in Italy and Spain, and their economies will accordingly be the worst affected. The restrictions are expected to stay in force until the end of April at least and be gradually lifted thereafter. Domestic transmission of the disease has been slower in Japan and the public health response has been less restrictive thus far. The Japanese government announced a nationwide state of emergency in mid-April, expanding a decree that had previously covered only seven prefectures. The state of emergency, expected to last for at least a month, gives prefectural authorities the power to request business closures and impose movement restrictions.

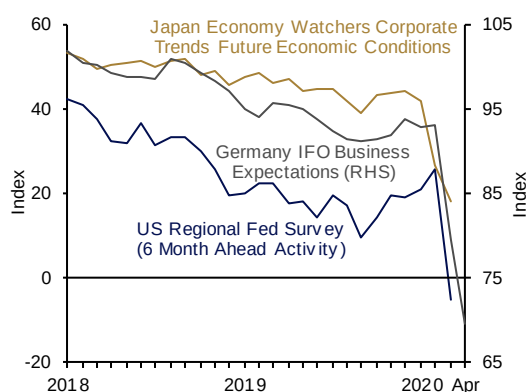
US economic data for March depict a sharp and broad-based pullback in activity. Retail sales fell 8.7% m-o-m, while industrial production dropped 5.4%, the steepest decline since 1946. The slowdown has had an immediate impact on the labour market: US non-farm payrolls fell by 701,000 in March, the first decline since September 2010, while the unemployment rate jumped by almost 1% point to 4.4%. Business confidence has weakened sharply across the G3 (**Chart 1.10**). US Federal Reserve district manufacturing surveys show slumping expectations for future business conditions. Germany's IFO business expectations index collapsed to 69.4 in April, the lowest since the Global Financial Crisis. Meanwhile in

⁶ The global CPI aggregate is weighted by country shares in Singapore's direct imports.

Japan, the Cabinet Office's Economy Watchers Survey for future business conditions plunged in the same month.

Chart 1.10 Business confidence in the G3 economies has fallen sharply

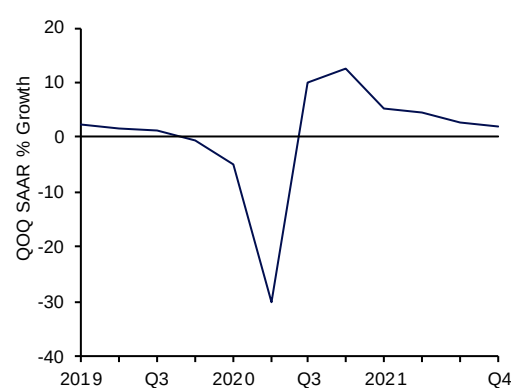
G3 business confidence surveys



Source: Haver Analytics and EPG, MAS estimates

Chart 1.11 G3 economic growth is expected to recover from Q3 2020

EPG forecasts for G3 GDP growth



Source: Haver Analytics and EPG, MAS estimates

The G3 economies have all eased fiscal and monetary policies substantially. Announced stimulus packages are worth around 7% of GDP in the US, 3% in the Eurozone and 5% in Japan, excluding various loan support programmes. These measures include increased health sector spending, financial support for businesses and households, and work compensation schemes for employees. The Eurozone economies will receive additional support from the bloc's supranational institutions, including the provision of credit lines to governments from the European Stability Mechanism and funding for wage subsidy schemes from the European Commission under a new Unemployment Reinsurance System. The US Federal Reserve, the ECB and the Bank of Japan have implemented a mix of monetary and credit easing measures to support aggregate demand, provide loan assistance to firms and address stresses in financial markets.

Economic activity is projected to recover in the second half of the year in the US and the Eurozone, and to a lesser extent in Japan, on the assumption that public health measures are gradually lifted in Q2 (**Chart 1.11**). In aggregate, the G3 economies are projected to contract by about 30% q-o-q SAAR in Q2, before picking up in the second half of 2020, bringing full-year growth to -5.8%. Growth is expected to come in at 3.8% next year, but the level of the G3's combined GDP at end-2021 is still projected to be around 5% below the pre-COVID-19 baseline. The shortfall is larger for the US and Eurozone, compared with Japan.

1.3 Asia ex-Japan

China's economy contracted sharply in Q1 but activity is gradually improving

China's GDP contracted by 9.8% q-o-q SA in Q1 2020 (**Chart 1.12**), as the authorities responded to the COVID-19 outbreak with lockdowns, quarantines, production halts and travel restrictions. Fixed asset investment declined 16.1% y-o-y in the quarter, while real retail sales slumped by 18.1% y-o-y in March after declining by 23.7% y-o-y in the Jan-Feb period. The

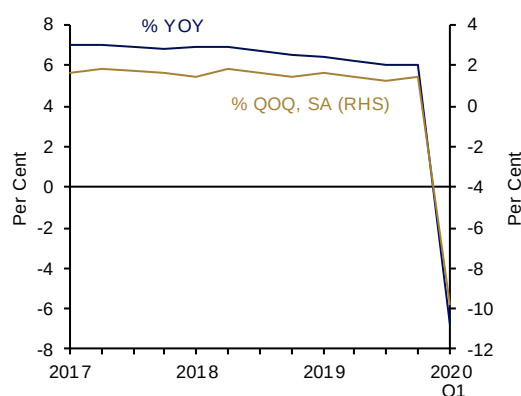
nationwide surveyed unemployment rate rose from 5.2% at the end of 2019 to 5.9% in March 2020.

High-frequency indicators that serve as proxies for economic activity suggest that the pace of normalisation in China picked up in early March, about four weeks after the authorities began gradually easing lockdown measures. At the end of March, the economy was operating at an estimated 75–80% of the norm for this time of the year, up from 50–60% in the middle of the month. However, the pace of normalisation appears to have slowed since early April. As at mid-April, indicators (including average coal consumption at six major power generation companies and traffic density in major Chinese cities) suggest that economic activity is only at 85–90% of normal levels (**Chart 1.13**).

The reasons for the slower work resumption in April are both domestic and external. As the risk of a renewed surge of COVID-19 infections from both imported and asymptomatic cases remains significant, several cities have reinstated partial lockdowns to contain the spread of the virus. These developments, coupled with highly uncertain near-term job and income prospects, have led households to remain cautious and to hold off spending, especially on services. In addition, the global spread of the disease has disrupted economic activity around the world, causing a fall-off in external demand. China's exports fell 6.6% y-o-y in March and 13.3% y-o-y in Q1.

Chart 1.12 China's GDP fell sharply in Q1 2020

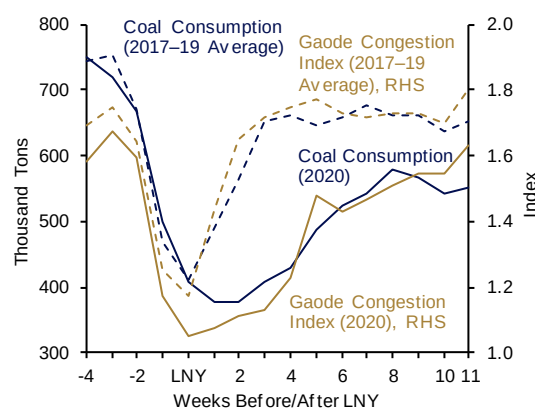
China's quarterly GDP growth



Source: National Bureau of Statistics

Chart 1.13 High-frequency data suggest China's economic activity is at 85–90% of normal levels

Average coal consumption at six major power generation companies, and congestion index for major Chinese cities (2020 vs. 2017–19 average)



Source: Wind and EPG, MAS estimates

Financial market volatility has amplified the COVID-19 shock

Emerging markets (EM) experienced the largest portfolio capital outflows on record in March 2020 as the heightened uncertainty and risk aversion caused by the COVID-19 pandemic triggered a global flight to safety and liquidity (**Chart 1.14**). A subset of emerging Asia economies⁷ recorded US\$53 billion in outflows of non-resident portfolio capital in March. This was significantly larger than outflows experienced in other recent episodes such as the “taper tantrum” in Q2 2013 (US\$10 billion), or when fears over a deteriorating global economic outlook intensified in H1 2018 (US\$27 billion), or even during the peak month of outflows

⁷ These are India, Indonesia, the Philippines, South Korea, Taiwan and Thailand.

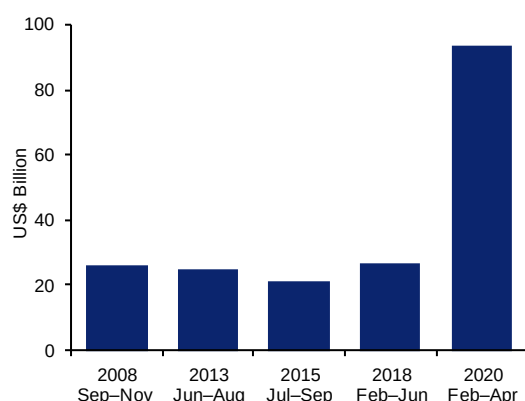
during the Global Financial Crisis (October 2008, US\$11 billion). Recent large capital outflows have put pressure on regional currencies, although Asia ex-Japan economies have seen a smaller depreciation on average than the larger EM countries (**Chart 1.15**).

Outflows abated and currency depreciations were partly reversed in early April, as the considerable scale of the global policy response stabilised investor confidence. However, the episode demonstrates the risks to EM from shifts in global investor risk appetite. If resumed and sustained, outflows could force regional authorities into pro-cyclical policy tightening, thus crimping growth further.

Multilateral agencies have acted to reduce the risk of a resumption of pressure by signalling their readiness to increase their lending, with the IMF providing up to US\$100 billion in financing that does not require a full-fledged programme, and announcing a new Short-term Liquidity Line. More broadly, member countries can also draw on the Fund's overall lending capacity of US\$1 trillion. The World Bank expects to deploy up to US\$160 billion over the next 15 months to help its member countries. In the meantime, the Asian Development Bank and the Asian Infrastructure Investment Bank have also increased their COVID-related funding support to less-developed countries.

Chart 1.14 EMs experienced record capital outflows in March 2020

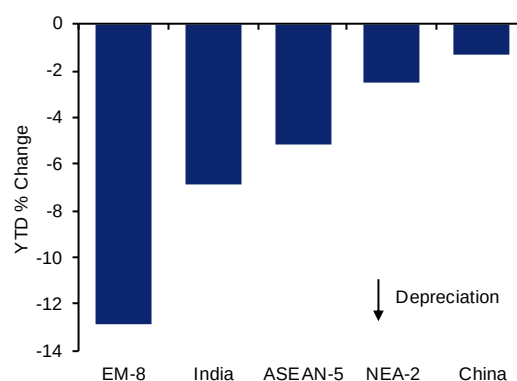
Emerging market capital outflows during stress episodes



Source: Institute for International Finance and EPG, MAS estimates

Chart 1.15 Regional currencies have generally weakened against the US dollar

Year-to-date change in aggregated regional exchange rates against the US dollar as at end-March 2020



Source: Haver Analytics and EPG, MAS estimates

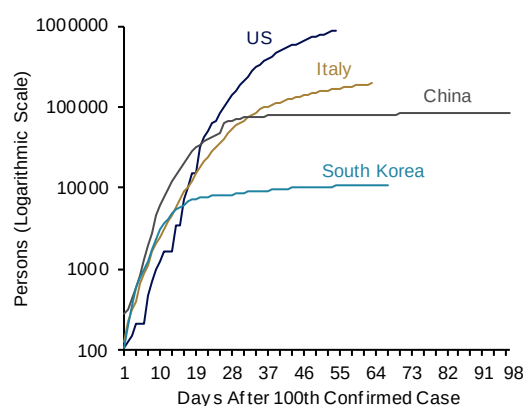
Note: EM-8 refers to Brazil, China, India, Indonesia, Mexico, Poland, Russia and Turkey; NEA-2 refers to South Korea and Taiwan.

Asia ex-Japan is heavily exposed to the sudden stop in travel and tourism and to supply chain disruption

The profile of COVID-19 outbreaks has been unusually varied across the Asia ex-Japan region. China and South Korea both initially experienced the same exponential increases in infections subsequently observed in many European countries and the US, but the former have been able to contain the spread of the virus (**Chart 1.16**). Another group of countries, namely India, Indonesia, Malaysia, the Philippines and Thailand, have seen more moderate growth rates of recorded infections, while a third group consisting of Hong Kong, Taiwan and Vietnam appear to have less pervasive outbreaks (**Chart 1.17**).

Chart 1.16 The outbreaks appear to have been contained in China and South Korea

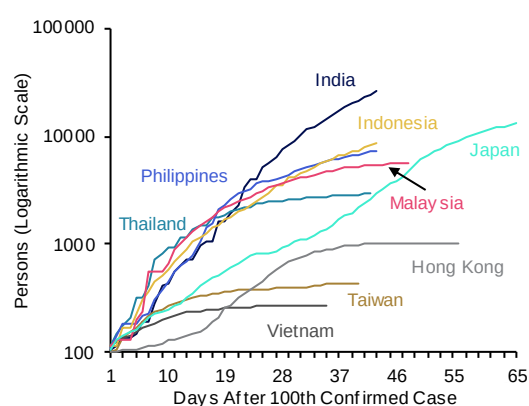
Number of COVID-19 cases in various countries



Source: WHO

Chart 1.17 The profile of COVID-19 outbreaks has varied widely across Asia ex-Japan

Number of COVID-19 cases in various Asia ex-Japan economies



Source: WHO

The variation in infection profiles has been accompanied by differences in governments' public health policy responses and in the concomitant economic disruption. High-frequency data on population movements points to a much smaller deviation from normal activity levels in Japan, South Korea and Taiwan, whereas India, Malaysia and the Philippines appear to be experiencing similarly larger falls in population mobility, due to social distancing policies, as in Western Europe (**Chart 1.18**).

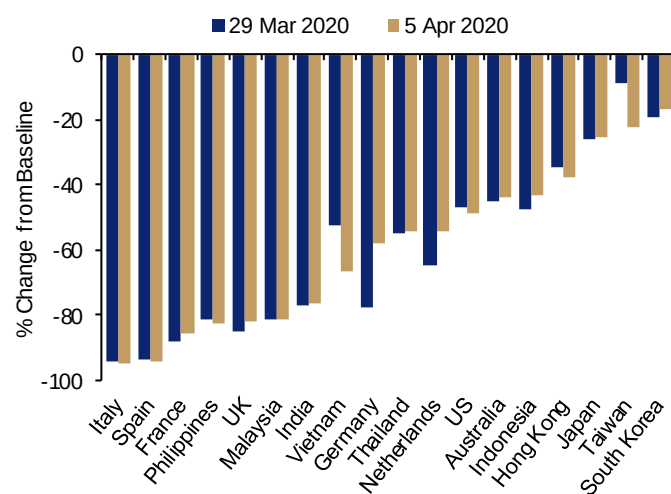
The COVID-19 shock has been rapidly transmitted through two channels: the curbing of international travel and the disruption of cross-border value chains. The ASEAN-5 economies in particular have been adversely affected given the high dependency of many economies on the tourism sector. For instance, Thailand and the Philippines generate about 20–25% of their GDP from travel-related activities.⁸ Manufacturing and trade activity have also contracted sharply in Asia ex-Japan, as partial or full lockdowns of countries around the world have severely disrupted supply chains. Indonesia, South Korea and Vietnam recorded sharp falls in their manufacturing PMI readings in March.

Asia ex-Japan's aggregate GDP is projected to contract by 20% q-o-q SAAR in Q1, before activity stabilises in Q2 and picks up to 15% q-o-q SAAR in Q3 and Q4. In the ASEAN-5 region, output in Q2 2020 is expected to be 8.3% lower than in end-2019, compared with projected declines of 11–12% each in the US and the Eurozone, consistent with the lesser degree of disruption in some of the regional economies. For 2020 as a whole, Asia ex-Japan GDP is projected to contract 1.2%, before recovering by 6.6% in 2021. This would leave the region's GDP at the end of next year at 1.9% below the level projected at the turn of the year.

⁸ According to estimates by the World Travel and Tourism Council and Oxford Economics.

Chart 1.18 Population mobility has fallen substantially in many countries

Population mobility trends at restaurants, cafes, malls and other recreational places



Source: Google Community Mobility Reports

Note: The baseline is the median value, for the corresponding day of the week, during the 5-week period from 3 Jan – 6 Feb 2020.

Box A: Does Infrastructure Development Affect the ASEAN-5 Countries' Ability to Attract FDI?¹

Introduction

Global developments since 2018, in particular the US-China trade tensions, have accelerated the ongoing process of supply chain reconfiguration underway in Asia, driven by shifts in comparative advantage including the rising labour costs in China. Prior to the COVID-19 outbreak, this process had led to an increasing proportion of foreign direct investment (FDI) being diverted to the ASEAN-5 countries.^{2,3} At the same time, governments in the region were ramping up efforts to raise potential growth through policy reforms and increased infrastructure spending, in a bid to boost their competitiveness and benefit from higher FDI inflows.

The positive spillover effects of FDI to host economies have been well documented (see Blomström *et al.* (2001) for an overview) and are built around the notion that foreign capital can complement domestic savings to increase the rate of capital accumulation. Unlike portfolio investment, direct investment also transfers technology and intangibles, such as knowledge and managerial best practices. FDI has been found to have the beneficial effect of raising long-run growth (see Pradhan (2009) for a study on the ASEAN-5 region) and hence, attracting FDI is a key component of a broader economic development strategy.

In this respect, an important question is whether policy reforms and infrastructure development within the ASEAN-5 region that enhance the business environment and improve competitiveness have aided in attracting FDI in the past. This Box carries out an empirical study that may shed some light on this question.

Public infrastructure investment in the ASEAN-5 and its potential benefits

The ASEAN-5 countries have generally fared well in terms of overall competitiveness and infrastructure quality, relative to the Asian average, in the last decade. In the World Economic Forum's Global Competitiveness Index (GCI), ASEAN-5's overall and infrastructure scores were higher than the rest of Asia's, and continued to improve at a faster pace than the latter (**Chart A1**). The World Bank's Logistics Performance Index (LPI) also reported better average ratings for ASEAN-5 *vis-à-vis* rest of Asia, in both overall performance and logistics infrastructure.

While the ASEAN-5 has taken significant strides in infrastructure development, its infrastructure investment needs are still significant, averaging 4% of GDP in 2020–40 according to data from the Global Infrastructure Hub (**Chart A2**). In the latest Article IV consultations with the various ASEAN-5 countries, the IMF finds that some of them lag in

¹ This Box is a collaborative project between the economists in EPG, MAS and the ASEAN+3 Macroeconomic Research Office (AMRO), and does not necessarily represent the official views of AMRO or MAS.

² The ASEAN-5 countries covered in this Box are Indonesia, Malaysia, the Philippines, Thailand and Vietnam.

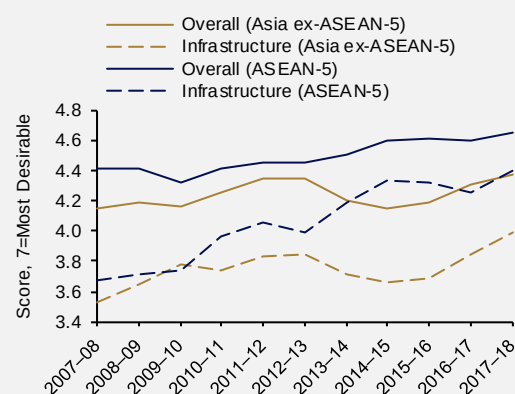
³ The IMF defines FDI as "when a unit resident in one economy makes an investment that gives control or a significant degree of influence over the management of a company that is resident in another economy." This concept is operationalised "where a direct investor owns equity that entitles it to 10 per cent or more of the voting power in the direct investment enterprise."

infrastructure development in areas such as transport, logistics and telecommunications (IMF, 2019a; IMF, 2019b; IMF, 2019c; IMF, 2020a and IMF 2020b).

The IMF (2014) identifies two ways in which an increase in public infrastructure investment affects an economy. First, it raises aggregate demand through the short-term fiscal multiplier and by potentially crowding in private investment, given the highly complementary nature of infrastructure services. Second, the supply-side productive capacity of the economy increases with a higher infrastructure stock. The IMF estimates that the contemporaneous effect of a 1% point of GDP increase in public investment raises output by 0.25%, which gradually rises to about 0.5% four years after the initial spending. AMRO (2019) also finds that if the ASEAN-4 countries (Indonesia, Malaysia, the Philippines and Thailand) closed their infrastructure spending gaps, their GDP could be boosted by 0.9–1.4% above the baseline, while Vietnam could see an increase of 2.1%.

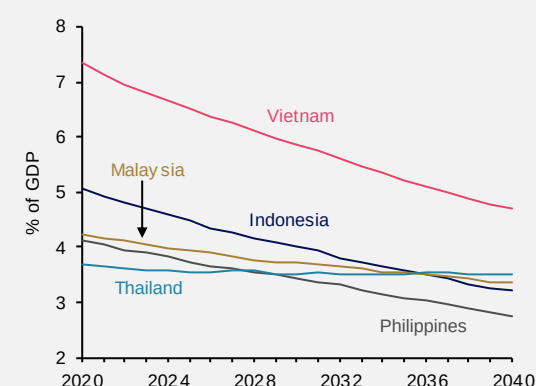
Moreover, Calderón and Servén (2004) find causal effects of infrastructure development on both long-run economic growth and income inequality. Specifically, the level of infrastructure stock has a significant positive effect on growth, while inequality declines both with a larger stock and improved quality of infrastructure services.

Chart A1 Global Competitiveness Index



Source: World Economic Forum and EPG, MAS estimates

Chart A2 ASEAN-5's infrastructure needs



Source: Global Infrastructure Hub

Examining the relationship between infrastructure investment and FDI inflows in the ASEAN-5

A large and diverse literature has examined the determinants of FDI inflows, although the findings are not always conclusive. One prominent strand focuses on macroeconomic determinants, which include economic activity in the host country, the regulatory and business environment, and economic stability; these can broadly be generalised into push and pull factors (see Fernandez-Arias (1996) for an overview for the push-pull framework; Hannan (2018) for a survey of determinants of capital flows, including FDI). There is a consensus across these studies that market size, as measured by GDP, is a robust and positive determinant of FDI. Notably, infrastructure in the host country can be an important pull factor for FDI, and higher gross capital formation in general can also help improve the investment climate (see, for example, Goodspeed *et al.* (2006), Kinda (2010) and Donaubauer *et al.* (2016) for studies that focus on developing economies).

In the light of this literature, a regression model is used to explain FDI through public sector investment (taken as a proxy for infrastructure spending), infrastructure quality, and economic competitiveness.⁴ In addition, GDP is included in the regressions to control for market size.⁵

The regression results in **Table A1** show that public investment is positively related to FDI across most model specifications, although the estimated size of the coefficient varies. In particular, a fixed effects (FE) regression with all the explanatory variables included suggests that for every 1% increase in public investment, FDI would increase by 0.5%. The ordinary least squares (OLS) results also point to the possibility of a positive effect from a more competitive environment on FDI.⁶

Table A1 Estimation results

Dependent Variable: ln(FDI)	Specification					
	OLS (1)	OLS (2)	OLS (3)	FE (4)	FE (5)	FE (6)
ln(GDP)	0.47** (0.12)	-0.04 (0.13)	-0.46** (0.17)	1.04** (0.40)	-0.10 (0.30)	-0.03 (0.38)
ln(GFCF)	0.05 (0.09)	0.16*** (0.03)	0.23*** (0.02)	-0.12 (0.37)	0.56** (0.26)	0.54** (0.26)
LPI Infrastructure		1.31*** (0.37)	-0.49 (0.39)		-0.44 (0.36)	-0.45 (0.37)
GCI			2.73*** (0.37)			0.02 (0.54)
Observations	64	49	47	64	49	47
R ²	0.26	0.26	0.60	0.72	0.75	0.75

Source: National authorities, Haver Analytics, World Bank, World Economic Forum and AMRO estimates

Note: Robust standard errors in parentheses. FE refers to models with country fixed effects. All models include a constant.

ln(FDI): log of total FDI in USD; ln(GDP): log of GDP in USD; ln(GFCF): log of public gross fixed capital formation in national currency; LPI infrastructure: Score of sub-index on infrastructure in the Logistics Performance Index compiled by the World Bank, with the biannual data interpolated to an annual frequency; GCI: Score of Global Competitiveness Index.

** Statistically significant at the 5% level

*** Statistically significant at the 1% level

⁴ Preliminary Granger causality tests for the ASEAN-5 countries suggest that public investment has predictive value for forecasting movements in FDI, over and above the information contained in the latter's past.

⁵ Ideally, long-run determinants of FDI such as labour market flexibility and financial depth should also be included, but given the small sample size, a more basic specification is used.

⁶ Similar conclusions are obtained using different data for public investment and alternative indicators representing infrastructure quality and competitiveness.

Next, the basic regression model is used to explain FDI differentiated by its source, sector and type. For this purpose, information on firm-level FDI found in Bureau van Dijk's Orbis Crossborder Investment database is extracted and aggregated at the country level.⁷ Using this database and the data on the explanatory variables in the earlier regression, the influence of public infrastructure investment on FDI by foreign state-owned enterprises (SOEs) and private entities can be examined separately. In addition, the sectors invested in and the types of projects (greenfield investment, brownfield investment, co-location or relocation) can also be distinguished. However, the exercise can only be performed for recent years, as the Orbis data only begins from 2013. The key results are shown in **Table A2**.

Table A2 Estimation results for sub-samples using Orbis Crossborder Investment database

Dependent Variable: ln(Capex_Orbis)	Specification					
	Private FDI		SOE FDI		Manufacturing FDI	
	OLS	FE	OLS	FE	OLS	FE
ln(GDP)	-0.48 (0.35)	2.58 (2.02)	1.43* (0.79)	6.48 (4.84)	0.06 (0.34)	1.84 (2.67)
ln(GFCF)	0.09* (0.05)	0.85 (0.70)	0.12 (0.10)	0.18 (1.32)	0.12** (0.06)	1.44* (0.80)
LPI Infrastructure	0.40 (0.56)	2.11** (0.84)	1.22 (1.29)	2.98 (2.77)	1.30* (0.68)	2.38* (1.35)
GCI			1.56 (1.65)	0.21 (5.35)	-0.86 (2.52)	-0.86 (2.52)
ln(Capex_SOE)	0.21** (0.08)	0.13 (0.11)				
Observations	28	28	28	28	28	28
R ²	0.32	0.56	0.36	0.43	0.24	0.44

Source: National authorities, Haver Analytics, World Bank, World Economic Forum, Bureau van Dijk and AMRO estimates

Note: Robust standard errors in parentheses. FE model with country fixed effects. All models include a constant. ln(Capex_Orbis): log of total capital expenditure for all relevant Orbis projects in USD; ln(GDP): log of GDP in USD; ln(GFCF): log of public gross fixed capital formation in national currency; LPI infrastructure: Score of sub-index on infrastructure in the Logistics Performance Index compiled by the World Bank, with the biannual data interpolated to an annual frequency; GCI: Score of Global Competitiveness Index; ln(Capex_SOE): log of total capital expenditure for all SOE Orbis projects in USD; SOE FDI is direct investment by state-owned enterprises.

* Statistically significant at the 10% level

** Statistically significant at the 5% level

*** Statistically significant at the 1% level

⁷ The Orbis Crossborder Investment database covers greenfield FDI projects (i.e., a company setting up or expanding its physical presence in a foreign market) as well as cross-border mergers and acquisitions (M&A deals). The database provides information on cross-border investment by both public and private companies, including details of the investor, investment amount and job creation, investor and project sector, and project stage over 2013–19 for the ASEAN-5 countries.

Table A2 Estimation results for sub-samples using Orbis Crossborder Investment database (continued)

Dependent Variable: ln(Capex_Orbis)	Specification			
	Services FDI		New Project FDI	
	OLS	FE	OLS	FE
ln(GDP)	-0.23 (0.43)	5.90* (2.84)	0.07 (0.33)	4.13* (2.34)
ln(GFCF)	0.08 (0.07)	0.36 (0.85)	0.15 (0.05)	0.82 (0.64)
LPI Infrastructure	-0.75 (0.80)	0.86 (1.26)	0.71 (0.70)	2.79** (1.05)
GCI	1.58* (0.82)	0.69 (2.24)	0.54 (0.76)	0.87 (2.18)
Observations	28	28	28	28
R ²	0.12	0.52	0.25	0.62

Source: National authorities, Haver Analytics, World Bank, World Economic Forum, Bureau van Dijk and AMRO estimates

Note: Robust standard errors in parentheses. FE model with country fixed effects. All models include a constant. ln(Capex_Orbis): log of total capital expenditure for all relevant Orbis projects in USD; ln(GDP): log of GDP in USD; ln(GFCF): log of public gross fixed capital formation in national currency; LPI infrastructure: Score of sub-index on infrastructure in the Logistics Performance Index compiled by the World Bank, with the biannual data interpolated to an annual frequency; GCI: Score of Global Competitiveness Index; New Project FDI refers to completely new projects (or greenfield investment).

* Statistically significant at the 10% level

** Statistically significant at the 5% level

*** Statistically significant at the 1% level

While the small panel makes interpretation difficult, there is some evidence that:

- FDI by private entities is positively related to public investment, infrastructure quality and foreign SOEs' investment. This finding provides support to the presence of crowding-in effects and also suggests that public GFCF alone might not capture the full extent of infrastructure investment in a country, as foreign SOEs may play a role as well.⁸ However, foreign SOE investment does not seem to be related to public investment, infrastructure quality and competitiveness, and is likely to be explained by non-economic factors.
- Public investment and infrastructure quality appear to matter more for foreign direct investment in manufacturing than in services.
- Infrastructure quality seems to be more relevant for greenfield FDI projects than for relocations, brownfield projects expansions, or co-locations.
- Existing infrastructure, albeit for a smaller field (logistics), appears to be more important than future infrastructure for FDI in private and greenfield projects.

⁸ The regression of private FDI is augmented with SOE FDI to account for possible crowding-in effects.

Conclusion

This Box has examined the relationship between FDI and infrastructure investment in the ASEAN-5 economies, including a more disaggregated analysis that accounts for differences between SOEs and private firms as the main investor, as well as variations across sectors and between new and existing projects. Based on the regressions, public investment, the level of infrastructure development and competitiveness are found to be associated with higher FDI. In addition, FDI by private entities is positively related to public investment, infrastructure quality and foreign SOEs' investment.

The empirical results in this study show the importance of infrastructure investment for the ASEAN-5's economic development strategy. When carried out together with structural reforms, infrastructure investment can significantly enhance the attractiveness of a country to FDI inflows, which bring a host of benefits and lead to higher potential GDP growth in the long run.

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2 The Singapore Economy

- The COVID-19 pandemic has dealt a significant blow to the Singapore economy, as the rapid spread of the virus across the globe and measures taken to contain it have exacted a heavy toll on business activity and consumer confidence. Singapore's GDP contracted sharply in the first quarter of 2020, reflecting a combination of travel restrictions, supply-side disruptions and the attendant decline in external and domestic demand.
 - The Singapore economy will experience a full-year contraction in 2020, with GDP growth projected at -4 to -1%, although at this juncture there remains significant uncertainty over the severity of the downturn, as well as the eventual recovery. The materialisation of downside risks, that largely depend on the course taken by the pandemic and efficacy of policy responses around the world, could tip the growth outcome in Singapore below the forecast range.
 - Amid the fall in final demand in the global economy and disruptions to supply chains worldwide, activity in Singapore's trade-related sector could slump further. Growth in modern services is also expected to moderate as the COVID-19 outbreak has diminished prospects in the financial sector, and dampened corporate spending on IT and professional services. Activities in the travel-related and domestic-oriented sectors will remain in the doldrums until there are clear signs that the pandemic has been sufficiently brought under control to allow a gradual lifting of containment measures.
-

2.1 Recent Economic Developments

With the onset of the COVID-19 outbreak in Q1 2020, the Singapore economy suffered its first year-ago decline since the Global Financial Crisis

The Singapore economy expanded at a modest pace in the final quarter of 2019, underpinned by growth in the modern services and domestic-oriented sectors. Trade-related activities remained weak but were expected to see an improvement alongside the recovery in the global electronics cycle. However, economic developments took a dramatic turn for the worse with the outbreak of COVID-19, which started in China late last year but has since swept across the world. Singapore's GDP contracted by 2.2% on a y-o-y basis in Q1 2020, the first negative quarter seen since the GFC (**Chart 2.1**). On a q-o-q SAAR basis, the economy shrank by 10.6%, a sharp retraction from the 0.6% growth recorded in the previous quarter.

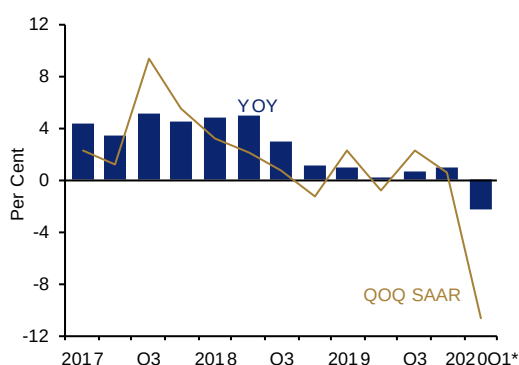
Initially, the main channels of impact were the travel-related and services industries, which have high in-person content and contact. EPG's Economic Activity Index (EAI)¹ showed that the travel-related sector, comprising air transport, accommodation and arts,

¹ The EAI is a composite index that aggregates the performance of a set of coincident high-frequency indicators across the major sectors of the Singapore economy.

recreation & entertainment, experienced a precipitous fall in Q1, exerting the largest drag on overall growth, despite accounting for only about 4% of GDP in 2019 (**Chart 2.2**). The domestic-oriented sector also contracted, amid heightened anxiety and negative sentiment which hit the consumer-facing industries, as well as supply-side disruptions to the construction industry. Similarly, modern services saw a marginal decline as corporate activity slowed and business sentiment soured. While the trade-related sector as a whole witnessed a mild uptick, the performance of the underlying industries was mixed.

Chart 2.1 Singapore's sequential GDP growth saw a sharp decline amid the COVID-19 outbreak

Singapore's real GDP growth

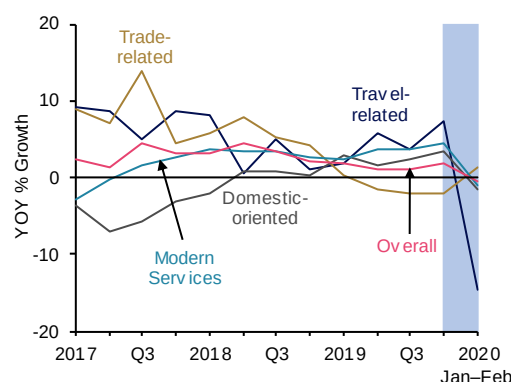


Source: DOS

* Advance Estimates

Chart 2.2 The travel-related sector was the most badly affected

Economic Activity Index



Source: EPG, MAS estimates

The travel-related sector weakened substantially alongside a slump in visitor arrivals

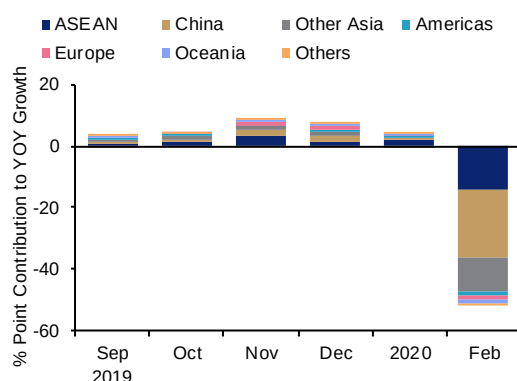
Since the start of the COVID-19 outbreak, many countries, including Singapore, have issued increasingly stringent travel advisories and restrictions on visitor arrivals to curb the number of imported infections. These measures have resulted in flight and event cancellations, with travel-related industries bearing the brunt of the impact.

According to the latest available statistics from STB, visitor arrivals plunged by 51% y-o-y in February and have grounded to a halt since 23 March as a series of ever tightening restrictions² culminated in a complete ban on short-term arrivals (**Chart 2.3**). Consequently, passenger movements at Changi Airport fell by 71% in March. Revenue per available room also plummeted as the hotel occupancy rate tumbled to 51% in February from an average of 87% in the past six months (Aug 2019 – Jan 2020), even as average room rates held steady (**Chart 2.4**). With tourist arrivals coming to a standstill, the arts, entertainment & recreation industry weakened sharply as well.

² On 29 January 2020, the Singapore authorities restricted entry or transit for new visitors who had travelled to Hubei in the prior 14 days, as well as holders of Chinese passports issued in Hubei. This was followed by bans on arrivals from all of China on 1 February. Subsequently, the border control measures were gradually expanded to cover South Korea, Iran and a number of European countries badly affected by the outbreak. On 16 March, with the escalation of the global pandemic, a 14-day Stay-Home Notice was imposed on those with recent travel history to ASEAN, Japan, Switzerland and the UK, which was subsequently extended to all visitors on 20 March. On 23 March, Singapore closed its borders to all short-term visitors.

Chart 2.3 Tourist arrivals have plunged amid tightened travel restrictions

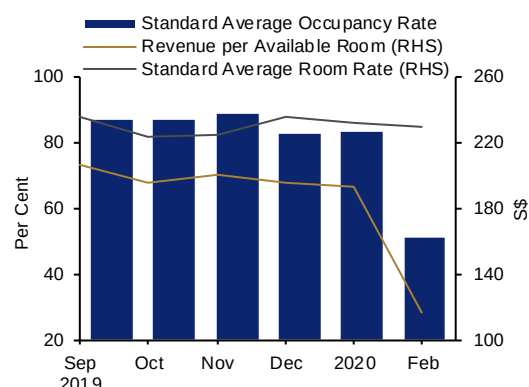
Monthly tourist arrivals



Source: STB

Chart 2.4 The sharp decline in visitor arrivals caused hotel occupancy to fall to about 50%

Monthly hotel statistics



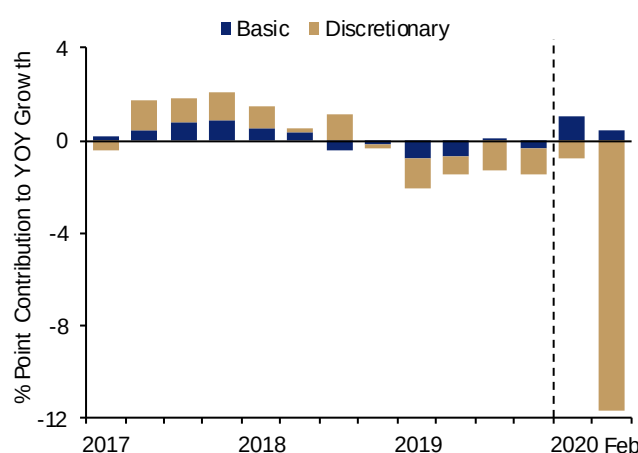
Source: STB

The domestic consumer-facing sector also took a severe hit

Amid heightened fear of COVID-19 infection, the consumer-facing sector suffered a significant setback in Q1, albeit to a lesser degree than the travel-related sector. Reduced footfall in shops caused retail sales volume (excluding motor vehicles) to contract by 11% y-o-y in February (**Chart 2.5**), with sales of discretionary items, such as department store goods, wearing apparel & footwear as well as watches & jewellery recording substantial declines. In comparison, sales in supermarkets grew by 14%, reflecting increased household purchases of groceries and other essential items. Spending on food & beverage (F&B) services recorded a decline of 16% in February, with sales volumes at restaurants and food caterers plunging by around 30% and those at cafes, food courts and other eating places falling by a milder 3.6%.

Chart 2.5 Retail sales contracted steeply, weighed down by cutbacks in discretionary spending

Growth in retail sales volume (excluding motor vehicles)



Source: DOS and EPG, MAS estimates

Note: Quarterly data for 2017–19 and monthly data for 2020.

Meanwhile, output in the construction sector fell by 4.3% y-o-y in Q1 2020, reversing the expansion in the preceding quarter. Private sector certified payments shrank by 7.1% in February, with broad-based declines across residential, non-residential and civil engineering works. Public sector certified payments fell by 2.4% over the same period, amid contractions in both residential and civil engineering works, even as output from non-residential projects grew at a double-digit pace. Notably, the lockdowns in China and Malaysia have disrupted the inflow of construction workers and raw material supplies, resulting in project delays.

Activity in the modern services sector was sluggish

Negative business sentiment and a general slowdown in corporate spending dampened activity in the modern services sector in Q1. Business services (excluding real estate) was the worst performing industry, amid a fall in demand for business & management consultancy services, as corporates mothballed consultancy studies to reduce expenditure. The curtailment of travel has also constrained the exports of professional services. Meanwhile, the rental and leasing segment performed poorly as demand for aircraft leasing services nosedived, following the imposition of travel restrictions around the world. Likewise, the rate of expansion of the ICT sector slowed in Q1, as firms likely postponed corporate investments in IT solutions and software to cut operating expenses amid collapsing revenues.

Within the finance & insurance sector, the banking segment was weighed down by weakening regional economic activity. In Jan–Feb 2020, the y-o-y growth of ACU non-bank loan to China declined as economic activity slowed due to the spread of COVID-19 infections in the country. Similarly, ACU non-bank loan growth to South Korea fell in February, when the number of confirmed cases in the country rose sharply. Meanwhile, the insurance segment had to contend with rising claims and falling premiums. Travel insurance claims rose from the widespread cancellation of flights and other travel-related bookings, while business claims registered an uptick, owing to the suspension of corporate operations and cancellation of events. Growth in activities auxiliary to financial services—comprising mainly credit card network players—also slowed, after expanding rapidly over the past two years. Credit card companies' cross-border business has taken a significant hit with overseas travel coming to a standstill. Although online grocery purchases have surged, as have e-commerce sales of daily necessities, the virus has blighted purchases of big-ticket items such as luxury goods, clothing and furniture.

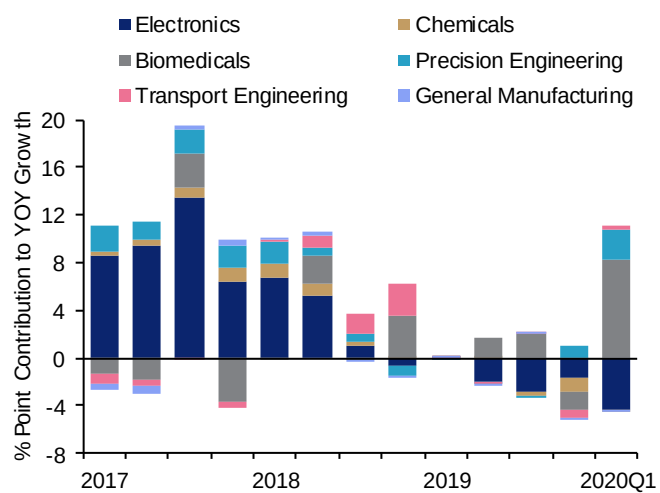
The performance of the trade-related sector was mixed

The Index of Industrial Production (IIP) expanded by 6.6% y-o-y in Q1, on the back of an exceptionally strong 68% surge in pharmaceuticals (under biomedical) output (**Chart 2.6**). Similarly, the precision engineering industry grew by a solid 20.6%. However, the performance of the rest of the manufacturing sector was more subdued. The electronics industry contracted by 10.5%, weighed down by the fall in semiconductor output, as the COVID-19 outbreak derailed the incipient recovery of the global electronics cycle. Within the transport engineering cluster, the marine & offshore engineering segment shrank by 1.8% alongside the fall in global oil prices, although this was offset somewhat by the growth of the aerospace segment.

The performance of trade services was also mixed. International exports remained firm, as real non-oil domestic exports and re-exports increased by 7.4% y-o-y and 2.8% in Q1, respectively. However, cargo activity was more muted amid the slowdown in global trade, with the volume of sea cargo handled at Singapore's ports falling by 0.1%.

Chart 2.6 Manufacturing was supported by an exceptional outturn in pharmaceuticals

Index of Industrial Production



Source: EDB

2.2 Economic Outlook

The COVID-19 pandemic has significantly diminished and clouded Singapore's economic growth outlook

The Singapore economy began 2020 against the backdrop of a broadly stabilising external outlook. With the signing of the US-China Phase 1 trade deal and nascent signs of a turnaround in the global electronics cycle, the domestic trade-related sector was anticipated to perform more strongly this year, lifting overall GDP growth. However, the COVID-19 pandemic has thrown the prospects of any recovery off course, having undermined spending and production through both demand and supply channels. Around the world, heightened fear and uncertainty and stringent containment efforts will continue to weigh heavily on global final demand, upon which the Singapore economy is reliant. At the same time, measures that restrict labour and goods mobility will disrupt global supply chains, imparting negative spillovers to Singapore given its hub status. Apart from the extensive economic repercussions, the fluid and fast-moving nature of the COVID-19 pandemic has also rendered highly uncertain the outlook for the Singapore economy. Accordingly, the 2020 GDP growth forecast range has been downgraded and widened, to -4.0 to -1.0%, from -0.5 to 1.5% previously. As a comparison, Singapore's full-year GDP growth came in at 0.1% during the GFC in 2009, -1.1% during the bursting of the IT bubble in 2001 and -2.2% during the AFC in 1998.

Prospects for Singapore will hinge on the course taken by the pandemic globally

Due to the high degree of interconnectedness between affected countries, the GDP growth outlook for Singapore will be contingent on the transmission and incidence of the virus, and the pace at which countries recover from its health and economic effects. These external circumstances will determine the depth and duration of the contraction in the Singapore economy, as well as the strength of its eventual rebound.

The pandemic has gone through several phases, with staggered outbreaks across the globe (**Table 2.1**). China reported its first case in Wuhan province in end-2019. By February this year, the virus had spread to the rest of China and beyond its national borders to some parts of Asia. Nonetheless, most of the infected cases then were still concentrated in China, and to a lesser extent South Korea. By March, the number of infected cases in Europe began escalating rapidly, first in Italy and Spain, and subsequently in other parts of the region. In early April, the US was next to witness a steep increase in the number of cases. More recently, fresh outbreaks have started to emerge in Asian emerging economies. In response, governments have implemented travel restrictions, social distancing measures and stringent lockdowns in an effort to flatten the infection curve.

China and South Korea were the first two countries to reach their peaks of daily new cases in the second and fourth week of February, respectively (**Table 2.1**). More recently, the infection curve also appears to have peaked in some European countries such as Italy, Germany and France. As infection rates decline in these countries, governments have gradually loosened containment measures. Nevertheless, as at late April, most countries remained in the containment phase. There is also the possibility of subsequent waves of the outbreak, even in countries that appear to have stamped out local transmission of the virus as they remain vulnerable to renewed infections from imported cases, especially when travel restrictions ease.

Table 2.1 The number of daily new cases may have peaked in several countries

Country	Total Cases	Jan		Feb			Mar				Apr				Latest Relative to Peak (%)	
		3	4	1	2	3	4	1	2	3	4	1	2	3		4
China	84,324	s*			p											0.3
Singapore	12,075	s												p		62.9
Malaysia	5,691	s								p						27.9
Thailand	2,907	s									p					17.1
France	121,338	s										p				23.4
US	860,772	s											p			86.8
Japan	12,829	s											p			59.4
Korea	10,718	s					p									1.2
Italy	192,994		s							p						46.1
Germany	152,438		s							p						28.1
India	24,506		s												p	-
Philippines	7,192		s									p				39.2
Spain	219,764		s									p				73.1
UK	143,468		s										p			61.8
Belgium	44,293			s										p		61.0
Iran	88,194					s						p				36.7
Netherlands	36,535						s						p			60.4
Switzerland	28,595						s					p				10.2
Indonesia	8,211							s					p			59.8

Source: WHO

Note: s: Start of outbreak; s*: Start of outbreak in China on Week 4 of December 2019; p: Highest daily number of cases reached. Latest Relative to Peak (%) refers to the latest number of new cases on 25 April, relative to the peak.

The economic consequences of strict containment measures around the world are significant. The impact on the Singapore economy works through three main channels. First, the collapse in foreign final demand is severely affecting Singapore's exports of goods and services. Second, disruptions to cross-border supply chains as manufacturers curtail their exports have lowered demand for Singapore's intermediate inputs. Third, heightened containment measures adopted locally are weighing heavily on the domestic-oriented sector.

Table 2.2 provides an estimate of Singapore's exposure through the first two channels. As an economy heavily reliant on international trade, Singapore is particularly susceptible to a fall-off in external demand. Notably, final demand in the two largest economies, the US and China, generates value added (VA) spillovers to Singapore that amount to 13% of nominal GDP, reflecting Singapore's inputs to consumption and investment in these economies. In addition, export activities in the US and China result in further VA spillovers to Singapore amounting to 3.3% of nominal GDP, which arise from Singapore's provision of inputs to exporters in these two countries, in line with its role as an intermediate supplier of goods and services in the global supply chain. Accordingly, the trade-related and modern services industries in Singapore are expected to bear the brunt of the COVID-19 impact arising from external spillovers.

Table 2.2 Singapore is highly exposed to the final demand and export activities of countries that have imposed partial or full lockdowns

	Economic Exposure to Country (% Share of Singapore's Nominal GDP)	
	Final Demand	Export Activity
China	7.0	2.8
US	6.4	0.5
Indonesia	2.6	0.4
India	2.3	0.5
Germany	2.2	1.0
Malaysia	1.8	1.6
UK	1.5	0.3
France	1.3	0.4
Thailand	1.2	0.8
Philippines	1.0	0.4
Italy	0.7	0.2
Spain	0.4	0.1

Source: OECD TiVA and EPG, MAS estimates

Note: Figures are calculated using latest available 2015 data.

Most trade-related activities face challenging circumstances as external conditions weaken

As an increasing number of countries implement lockdown measures, the attendant fall in external demand and trade has darkened the prospects for Singapore's trade-related sector. Indeed, the latest PMI reading in March for Singapore's manufacturing sector fell further to 45.4 from 48.7, reflecting the severe deterioration in outlook. However, the impact could be uneven across different industries. For instance, within the manufacturing sector, highly procyclical industries which are related to oil and electronics will likely be most negatively affected. In comparison, medical-related industries, such as medical technology and pharmaceuticals manufacturing, could experience positive growth (**Table 2.3**).

Table 2.3 The pandemic impacts the manufacturing industries differently

Examples	
Negatively affected	Oil-related: Marine & offshore engineering (3.1%), Petroleum refining (1.1%), Petrochemicals manufacturing (6.7%) Electronics-related: Electronics manufacturing (39.3%), Precision engineering (13.8%)
Positively affected	Medical-related: Medical technology manufacturing (4.8%), Pharmaceuticals manufacturing (13.1%)

Note: Figures in parentheses refer to 2019 industry weights within the IIP.

The deterioration of global oil markets would have implications for a wide range of oil-related industries

The collapse in global demand and the supply glut in the market have resulted in a plunge in crude oil prices and a spike in price volatility, which have brought about a challenging environment for the oil-related segments of Singapore's economy. Apart from manufacturing activities such as marine & offshore engineering (upstream), petroleum refining and petrochemicals manufacturing (downstream), midstream activities, such as wholesale trade and transportation & storage of crude oil and fuels, could also be affected. Collectively, these industries account for around 4% of Singapore's GDP.

In particular, the wholesale trade of fuels is of concern as it is a sizeable industry that generated an operating surplus of around S\$13 billion in 2018, accounting for 4.7% of Singapore's total Gross Operating Surplus (GOS) (**Table 2.4**). There were only 522 establishments in the industry that year, translating to an average operating surplus of S\$25 million per establishment. The performance of each entity could thus have a significant influence on the entire industry. Further, the fuels wholesaling industry is likely to have strong linkages with other industries such as petroleum refining, transportation & storage, petrochemicals manufacturing and finance. These industries could be impacted by contagion effects in the event of a widespread failure of firms involved in fuels wholesale trade.

Table 2.4 Wholesale trade of fuels accounts for a sizeable share of Singapore's total Gross Operating Surplus

	2018	% Share of Total GOS
Number of establishments	522	
Operating receipts (S\$ million)	1,619,561	-
Operating expenditure (S\$ million)	1,607,027	
Operating surplus (S\$ million)	12,820	4.7

Source: DOS and EPG, MAS estimates

Note: Operating surplus is defined as operating receipts minus operating expenditure plus depreciation of fixed assets.

The global electronics cycle is unlikely to recover amid the pandemic

The global electronics cycle showed nascent signs of a recovery towards the end of 2019. However, the COVID-19 outbreak has likely delayed the upturn, as more cautious spending by both consumers and corporates weighs on final demand for electronics. While there could be a boost as consumers and corporates purchase new equipment for work-from-home arrangements, this is likely to be temporary. In the coming months, cutbacks in consumer purchases of electronics are expected as stores remain closed and product launches are delayed. The domestic electronics sector could thus weaken further in the next few months.

Nevertheless, the expected rollout of 5G networks globally later this year could entice some consumers and businesses to upgrade to 5G-enabled devices and services, thus supporting final demand. The global electronics cycle could therefore stage a strong recovery, with positive spillovers to the domestic electronics sector and the upstream machinery and equipment industry.

Industries which manufacture medical products could see strong demand arising from the pandemic in the short term

The pandemic has boosted demand for medical products, such as ventilators, masks and COVID-19 test kits. Several Singapore-based production lines are involved in the production of medical products in the fight against the outbreak. For instance, Dyson will, reportedly, manufacture digital motors that will eventually be assembled into its ventilators. Other non-medical firms, such as Razer and ST Engineering, are setting up production lines to manufacture masks. Singapore-based medical technology firm, Biolidics, has also developed rapid test kits. When a vaccine for COVID-19 is eventually developed, Singapore could play a role in the eventual mass production of vaccines due to the presence of major global pharmaceutical firms. Overall, production in these industries should see positive growth in the coming quarters.

Modern services will face multiple headwinds in the months ahead

Growth in financial services is expected to moderate as the COVID-19 outbreak softens prospects in banking, other auxiliary activities, and insurance. A significant decline in regional aggregate demand will lead to a deterioration in ACU non-bank loan growth, while net interest income will pull back amid deferments or defaults on repayments of mortgages and secured corporate loans. In addition, the precipitous fall in private consumption expenditure will weigh heavily on credit card network players that earn commissions from payment transactions processed through their network. That said, the current enforcement of social distancing measures and lockdowns globally will hasten the pace at which consumers and businesses transit towards cashless modes of payment. This will bode well for credit card network players when the pandemic ends, as more payments are likely to move permanently to the digital space. Meanwhile, the insurance segment will continue to face rising medical and commercial claims as the human toll climbs and businesses remain shut. Notably, reinsurers stand to lose most from extreme mortality events like pandemics. Premiums received from existing insurance holders are also expected to decline following MAS' announcement that holders of life and health insurance policies will be allowed to defer premium payments for up to six months while maintaining insurance coverage.

Likewise, activity in the business services sector is not expected to pick up until the health emergency is resolved. Exports of professional services that require overseas travel will be capped by prohibitions on international travel. Growth in other administrative & support services will continue to be suppressed as meetings, incentives, conferencing and exhibitions (MICE events) are cancelled. At the same time, the rental & leasing segment will remain weak due to soft demand for aircraft leasing services. Until travel restrictions across the world are lifted and air traffic returns to pre-pandemic levels, the outlook for the segment is tilted towards the downside.

In the ICT sector, firms involved in the online consumer-facing business should continue to gain from increased online transactions. In comparison, the overall demand for business-to-business IT & information services is likely to remain weak until corporate activity firms up again. Nevertheless, demand for remote-work services, bolstered by the two-month circuit breaker, is expected to provide some reprieve. Many companies have had to activate work-from-home arrangements by changing their back-end work processes, in compliance with the Infectious Diseases Act that mandates all employers to implement telecommuting measures unless they are not feasible. Moreover, Enterprise Singapore's recently launched E-commerce Booster Package, aimed at helping SME retailers with little e-commerce

experience to start selling online, should benefit IT companies involved in providing related technical solutions.

Activity in the travel-related sector will remain subdued until the pandemic is brought under control

Recovery in the worst hit travel-related sector will only take place when the virus outbreak is sufficiently controlled to allow a gradual lifting of travel restrictions. It is unclear at this stage when that will occur and signs are suggesting that the situation is unlikely to turn around decisively even at the end of this year. Consequently, visitor arrivals and MICE events may remain sluggish in the latter part of 2020. It has also been announced that operations at Terminal 2 of Changi Airport will be suspended until end-2021 as part of a cost-cutting move. Developments over the past few months already point to the likely outcome that 2020 will be the worst performing year for Singapore's tourism industries since 2003, during the outbreak of SARS.

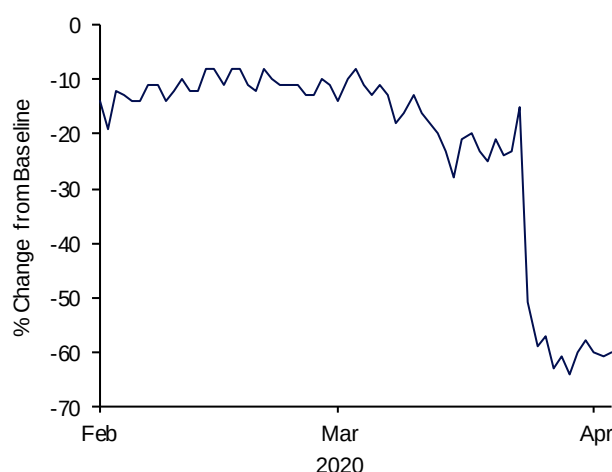
The implementation of stringent containment measures will have a substantial impact on the domestic-oriented sector

In view of the sharp increase in locally-transmitted infections in April, the Singapore government announced the implementation of circuit breaker measures from 7 Apr – 4 May, which is essentially a partial shutdown of the economy. On 21 April, the measures were further extended by another four weeks till 1 June, together with the implementation of tightened measures such as the closure of more workplaces to decisively bring down the number of community cases.

Consumer-facing firms deemed to be “non-essential”, including those in retail, entertainment and personal services, have suspended operations during the circuit breaker period. Operations at F&B outlets have also been severely disrupted due to safe distancing rules and the prohibition on dining-in. Based on data from Google location notification services, visits to restaurants, malls and other recreational places have declined by about 60% as at 17 April, relative to the first five weeks of 2020 (**Chart 2.7**).

Chart 2.7 High-frequency data shows a step-down in movements in restaurants, malls and other recreational places

Population mobility trends at restaurants, cafes, malls and other recreational places



Source: Google Community Mobility Report, Singapore

Note: The baseline is the median value for the corresponding day of the week during the five-week period from 3 Jan – 6 Feb 2020.

Shifts in retail spending habits are expected in the short term. Households will increase spending on daily necessities due to more time spent at home, while eschewing discretionary spending, particularly on luxury and durable goods, as physical stores are closed. F&B outlets near residential areas, which remain open for takeaway or delivery, may also outperform higher-end restaurants that tend to be concentrated in business districts. The Food Delivery Booster Package rolled out by Enterprise Singapore will help more food establishments optimise their online presence and improve sales. All in, the circuit breaker measures will have varying degrees of impact on approximately 60% of private consumption expenditure (**Table 2.5**). Although some recovery in discretionary retail spending is anticipated once the circuit breaker measures are relaxed, motor vehicle sales are still expected to remain soft, in tandem with a projected decline in Certificate of Entitlement quotas and lingering weakness in consumer sentiment.

Table 2.5 About 60% of private consumption expenditure has been affected by the circuit breaker measures

	Share of Private Consumption Expenditure, 2019 (%)	Impacted by Circuit Breaker Measures
Total Private Consumption Expenditure	100	-
Miscellaneous Goods & Services	18.6	Yes
Housing & Utilities	17.6	No
Transport	13.6	Yes
Recreation & Culture	9.8	Yes
Food Services	7.0	Yes
Health	6.8	No
Food & Non-alcoholic Beverages	6.1	No
Furnishings, Household Equipment & Maintenance	4.0	Yes
Communication	3.9	No
Education	3.7	No
Clothing & Footwear	3.0	Yes
Accommodation Services	2.6	Yes
Alcoholic Beverages & Tobacco	1.6	No
Net Residents' Expenditure Abroad*	1.4	Yes

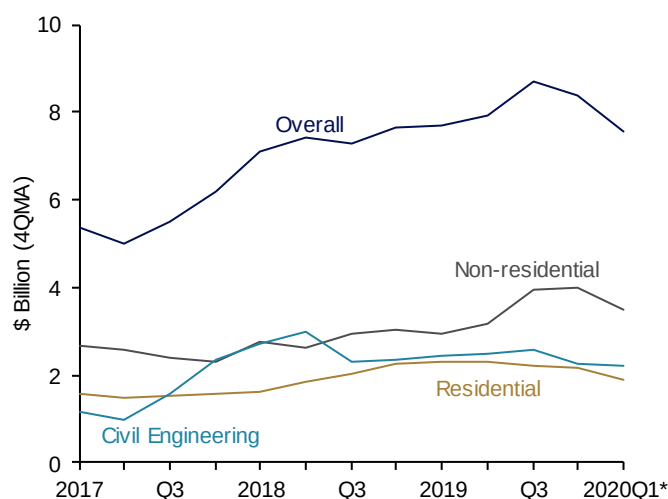
Source: DOS and EPG, MAS estimates

* Net residents' expenditure abroad is derived by taking residents' expenditure abroad less non-residents' expenditure locally

Meanwhile, construction activity will be disrupted in Q2 due to work stoppages during the two-month long circuit breaker period and a spike in infection cases among workers staying in dormitories. Barring a further extension of the measures and other supply-side disruptions, the construction sector should see some recovery in H2, underpinned by infrastructure projects such as the Deep Tunnel Sewerage System Phase 2, Thomson-East Coast MRT Line and Runway 3 for the Changi Airport Terminal 5. **(Chart 2.8).**

Chart 2.8 The pipeline of projects will provide a boost to the construction sector once activity resumes

Contracts awarded



Source: BCA

* Estimated from Jan–Feb 2020 data

There is significant uncertainty over the duration and intensity of this recession

Overall, the near-term outlook for the Singapore economy is fraught with uncertainty. There is a poor understanding of the evolution of the COVID-19 situation globally, which in turn implies that the depth and duration of the downturn in Singapore, as well as the strength of the eventual recovery, remain unknown. In all likelihood, Singapore's GDP will contract more sharply in Q2 2020 than in Q1, given the severity of the spread of the virus in Singapore's major trading partners, as well as the strict measures to break the circuit of transmission domestically. It is unclear at this stage if the disease will taper off globally in the second half of the year, and the risks of subsequent waves of infections are high until a vaccine is found. Given the likely protracted nature of this pandemic, containment measures can only be wound down in a gradual manner. In fact, intermittent rounds of re-containment measures may be required, thus hampering a decisive rebound in economic activity.

There are significant downside risks to Singapore's growth outlook for 2020. First, the GDP decline in Q2 could be worse than anticipated if affected countries around the world, including Singapore, deploy even more stringent containment measures that further constrain economic activity. Any fallout in global financial markets that further undermines confidence could create negative feedback loops, resulting in knock-on effects on the economy. Second, if the pandemic takes longer to be brought under control and the resumption of global economic activity is delayed, persistent softness in global final demand could delay the recovery of the Singapore economy. Finally, given that complete containment is harder to achieve compared to the SARS outbreak, due to the more contagious but less detectable nature of COVID-19, the recovery in the global economy could be more gradual and less decisive if persistent uncertainty causes consumers and firms to delay spending. The materialisation of any combination of these risks could bring GDP growth below the projected -4 to -1% range currently.

3 Labour Market and Inflation

- Labour market conditions had already softened prior to the outbreak of COVID-19. Job creation in the trade-related sector was weak in Q4 2019, even as overall employment gains rose due to stronger job growth in the construction sector. The resident unemployment rate stayed at 3.2%, slightly above its recent historical average, while resident wage growth fell in the last quarter of 2019, pulling the whole year growth down to 2.6%, from 3.5% in 2018. On the whole, a modest degree of labour market slack had emerged at the end of last year.
 - In 2020, the abrupt pullback in economic activity due to the virus outbreak will weigh heavily on labour demand across broad swathes of the economy. Labour market slack will increase, even as firms accommodate the temporary decline in economic activity by reducing working hours and putting workers on no-pay leave. Some firms will also reduce workers' salaries. The consequent decline in monthly aggregate wages will be a key means of labour market adjustment. In addition, the government's financial support to preserve jobs will be a significant factor mitigating the scale of job losses and wage reduction. Nonetheless, amid the sharp pullback in hiring intentions and some retrenchments, the resident unemployment rate will rise.
 - MAS Core Inflation fell to 0% y-o-y in Q1 2020 from 0.5% in Q4 last year, due in part to the effects of COVID-19. The overall cost of services declined in Q1, with the drop particularly pronounced in travel-related services. Prices of retail goods also saw large declines across all major goods categories. Headline inflation remained positive, easing to 0.4% in Q1, from 0.6% in the previous quarter, as non-core components of the CPI continued to record positive, albeit smaller, contributions to headline inflation.
 - Both core and headline inflation are expected to average between -1 to 0% in 2020. The downward revision to the forecasts primarily reflects the disinflationary effects of the sharp global and domestic economic contractions. Externally-driven inflation and global oil prices will remain low, while the emergence of labour market slack will dampen domestic cost pressures. These factors should outweigh any increases in the prices of imported food arising from supply-side disruptions. Overall, a larger share of components in the CPI basket are expected to experience outright price declines this year. Disinflationary pressures will thus broaden in the economy.
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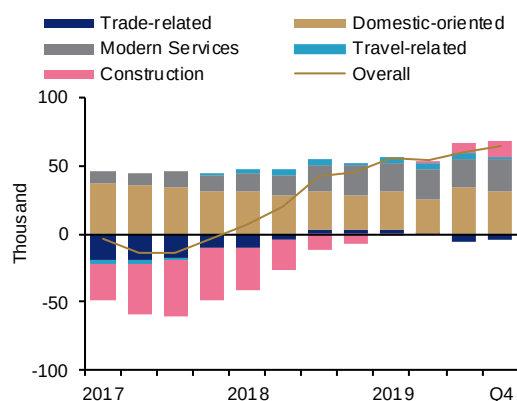
3.1 Labour Market

Labour market conditions were soft prior to the COVID-19 shock

Global and local containment measures to limit the spread of the COVID-19 pandemic have resulted in the stoppage of many economic activities. This will feed back into the domestic labour market, as demand for workers falls sharply in tandem. Labour demand was already showing some signs of weakening in Q4 2019. The larger year-on-year increase in employment growth was mostly driven by construction (**Chart 3.1**). At the same time, headcount expansions in the travel-related¹ sector grew more slowly while the retail segment² in the domestic-oriented sector continued to shed workers. A steady pace of job gains was recorded in the modern services sector but employment in the trade-related sector continued to contract, reflecting lingering weakness in electronics manufacturing and wholesale trade.

Chart 3.1 The pickup in total job gains in Q4 2019 was mainly due to the construction sector

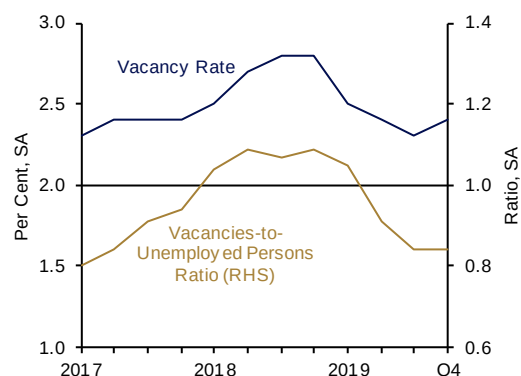
Year-on-year employment change by sector



Source: MOM and EPG, MAS estimates

Chart 3.2 Labour market indicators pointed to weak labour demand at the end of last year

Vacancy rate and vacancies-to-unemployed persons ratio



Source: MOM and EPG, MAS estimates

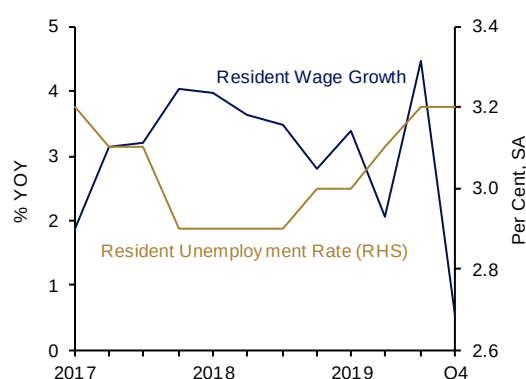
Aggregate labour market indicators were mostly soft in Q4 2019. While the overall job vacancy rate ticked up that quarter, it remained relatively low compared to 2018 (**Chart 3.2**). Similarly, the ratio of job vacancies to unemployed persons stayed below unity, indicating relatively weak labour demand. These factors kept the resident unemployment rate (SA) slightly elevated at 3.2% in Q4 2019, above its ten-year historical average of 3.0% (2009–18) (**Chart 3.3**). Resident wage growth also eased to 0.5% y-o-y in Q4, bringing the average increase for 2019 as a whole to 2.6%, down from 3.5% in 2018.

¹ The “domestic-oriented” sector includes land transport, retail trade, food and beverage (F&B), real estate, administrative & support services, community, social & personal services (excluding arts, entertainment & recreation) and utilities & others. The “modern services” sector comprises ICT, financial & insurance and professional services. The “trade-related” sector consists of manufacturing, wholesale trade and water and other transport industries. The “travel-related” sector is made up of air transport, accommodation as well as arts, entertainment & recreation industries.

² On a q-o-q basis, employment in the retail sector rose due to the seasonal increase in demand for workers.

Chart 3.3 Resident unemployment remained elevated in Q4 2019, while wage growth eased

Resident wage growth and unemployment rate

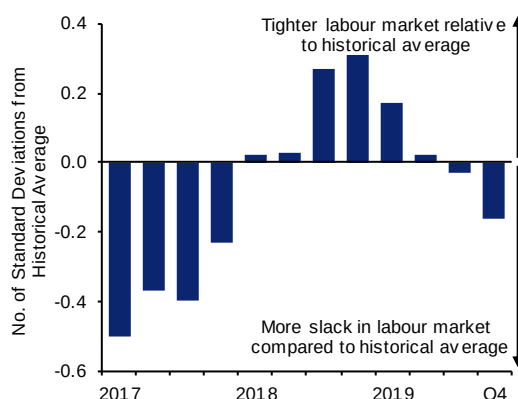


Source: MOM and CPF

Note: Resident wage growth is based on average monthly earnings.

Chart 3.4 A modest degree of labour market slack has emerged

Labour market pressure indicator (LMPI)



Source: EPG, MAS estimates

EPG's summary labour market pressure indicator (LMPI) posted a reading of -0.16 in Q4 2019, a further slippage from -0.03 the quarter before, confirming that a degree of labour market slack had emerged (**Chart 3.4**). Nevertheless, the amount of spare capacity in the labour market was relatively low compared to previous periods of weak economic growth. For example, the LMPI averaged -0.4 from mid-2016 to 2017, and -1.0 during the Global Financial Crisis. In Q3 2003, the LMPI reached a low of -2.2 , amid an all-time high resident unemployment rate of 6.2% in the prior quarter, following the outbreak of SARS and an extended period of economic weakness.

The COVID-19 outbreak will dampen overall employment growth in 2020

This year, labour demand will likely decline significantly across most sectors in the economy as overall activity contracts. Largely reflecting measures to contain the outbreak, employment will be most severely affected in the industries that have experienced a "sudden stop". These include the travel-related industries of air transport, accommodation, and arts, entertainment & recreation services, as well as domestic consumer-facing services, comprising land transport, retail trade, food services and other personal services. These sectors are highly labour intensive and collectively employ close to a fifth of the resident workforce. Employment in these industries was experiencing relatively weak growth compared to the rest of the economy even prior to the COVID-19 outbreak (**Chart 3.5**). Workers in retail trade, F&B and recreation services are most vulnerable to being laid-off, as competitive pressures in these industries were already acute. Moreover, as many firms in these industries tend to be small, they could also face significant credit constraints, which would limit their ability to hold on to their workers.

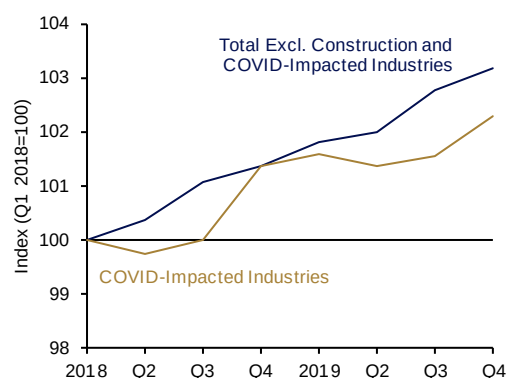
Employment growth will also weaken in the trade-related sector as external demand declines. The pullback in global investment and international supply-side disruptions will weigh on hiring in the electronics and precision engineering industries. The weak outlook for global oil prices and corresponding decline in capital expenditure and demand for oil-related services will also dampen job prospects in the transport equipment and supporting hub services industries. Singapore's goods and services trade will decline in tandem with weaker

global growth and have negative knock-on effects on employment in the maritime and aviation industries. In the financial & insurance services sector, job gains are also likely to be muted as lending slows and financial market turmoil dampens sentiment-sensitive activities. Overall, headcount is only expected to discernibly expand in a handful of industries such as construction, healthcare and public administration & education. The anticipated expansions largely reflect ongoing public infrastructure projects as well as government measures such as the SGUnited Jobs Initiative, which will create about 10,000 jobs in these areas over the next one year. (See Chapter 4 for more details and other government measures to support employment.)

Business surveys that were conducted after the outbreak attest that hiring intentions have fallen sharply amid heightened uncertainty. For instance, the sub-index for employment in the Singapore Commercial Credit Bureau's (SCCB) Business Optimism Index points to a contraction in Q2 2020, as all sectors surveyed expect headcount to be either frozen or reduced. In a survey by Mercer Singapore in March, more than a fifth of the 232 companies surveyed will not hire to replace attrition this year, while slightly more than half expect to hire for replacements only.³ The SBF-Experian SME index, which tracks business expectations among small and medium enterprises, noted that hiring expectations, while positive, have fallen in the domestic-oriented sector of retail and F&B services for the upcoming two quarters.⁴ Business sentiment is likely to have deteriorated even further since then as the SBF survey was mostly conducted in February (Chart 3.6).

Chart 3.5 Employment growth in the impacted sectors were weak even prior to the pandemic

Employment by industries

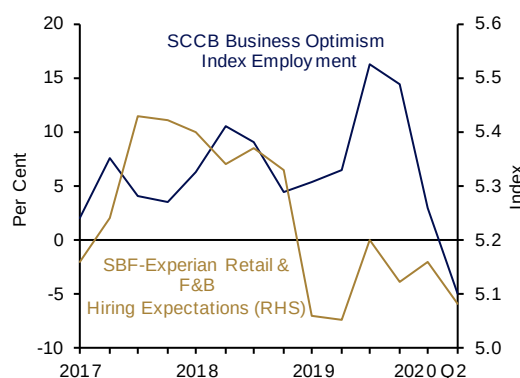


Source: MOM and EPG, MAS estimates

Note: "COVID-Impacted" industries refer to retail trade, accommodation & food, air transport, land transport, arts, entertainment & recreation and other personal services industries.

Chart 3.6 Surveys on business sentiment point to a decline in hiring expectations

Employment expectations



Source: SCCB, Dun & Bradstreet Singapore and Singapore Business Federation (SBF)

Note: SBF-Experian Retail & F&B Hiring Expectations is an index with a scale from 0 to 10. A reading above 5 indicates expansion while a reading below 5 signals contraction.

³ Mercer Singapore (2020), "Singapore COVID-19 Pay & Bonus Pulse Survey", March 26.

⁴ Hiring expectations for retail trade and F&B services industries fell from 5.16 to 5.08. However, as the survey was conducted between 13 January and 28 February 2020, during the early stages of the COVID-19 outbreak, the hiring outlook is likely to have worsened further since then.

The government has implemented a slew of measures to support employers and workers

Against this backdrop, the government has provided unprecedented financial support for firms to hold on to their workers. In particular, the Jobs Support Scheme (JSS) provides a 25% cash grant for the first \$4,600 of wages for each resident employee, with the level of support increasing to 50–75% of resident wages for more highly affected sectors. This support will last for nine months until December. In April and May, the extent of support given on wages was boosted to 75% for all sectors, in view of temporary workplace closures implemented under the government's enhanced social distancing measures from 7 April to 1 June. As firms will only receive this cash support for workers on their monthly payroll, the JSS incentivises firms to retain their workers. It should also help to reduce the incidence of furloughed workers and wage reductions as the cash grant is calibrated to each resident worker's gross monthly wages.

Box B shows that the transportation & storage, accommodation & food services and wholesale & retail trade industries are expected to benefit proportionately more than the rest of the economy from the JSS as they employ a larger share of workers earning less than the eligibility cap. The cash injection from the JSS is likely to play a critical role in helping firms in these industries tide over this period, mitigating the scale of retrenchments. In addition, the government will provide a one-off \$750 rebate of foreign worker levies for each Work Permit or S Pass holder, and waive foreign worker levies for two months to help firms retain their foreign workers and keep their capabilities intact amid the circuit breaker measures. These liquidity injections by the government are timely as the SCCB has revealed that more firms are struggling to meet their payment obligations.⁵

Apart from measures to forestall excessive firm closures and job losses, the government also sought to bolster job creation, particularly in areas that are expected to see strong long-term demand. In particular, the SGUnited Jobs initiative was introduced to counter some of the decline in job opportunities. The initiative coordinates and hires for short-term, temporary jobs needed to handle the increase in COVID-19 related operations, or to cope with disruptions in firms' labour supply. The public sector has also accelerated hiring plans for permanent roles in the public service and sectoral partner institutions in areas such as healthcare, early childhood care and education, and social services. At the same time, the E-Commerce Booster Package, launched by Enterprise Singapore, should also uplift e-commerce-related manpower demand during the pandemic as it will fund 90% of qualifying manpower costs temporarily. In the financial services industry, MAS is doubling the salary support for financial institutions that hire local fresh graduates or workers from other industries. These schemes should help strengthen job creation in segments of the labour market that are more insulated from pandemic effects, or which are experiencing an increase in manpower needs as demand for their goods or services surge during the outbreak.

⁵ Data from SCCB released on 6 April 2020 found that delayed payments accounted for 46% of all monitored payment transactions in Q1 2020, higher than the 37% in Q1 2019.

The government has also eased regulations and leveraged on private-public partnerships to further support workers. For instance, the government has worked directly with the private sector to redeploy excess labour to fill short-term manpower gaps in high demand sectors such as healthcare and logistics.⁶ Separately, the Ministry of Transport also announced a temporary liberalisation of point-to-point transport regulations to allow taxi and private hire car drivers to participate in delivery services. These initiatives should help to reduce matching frictions and facilitate worker mobility from negatively impacted sectors. In addition, the National Wages Council (NWC) has encouraged employers that have implemented job-sharing arrangements, shorter work weeks, or temporary layoffs to support affected employees who may want to take on a second job with another employer to supplement their income.

Wages, rather than employment, will bear the brunt of the negative shock in the near term

As revenues shrink, firms are likely to reduce labour costs via a combination of reductions to wages and headcount. Notwithstanding the government's support measures, some firms affected by the fallout from COVID-19 may still have to undertake labour cost adjustment measures such as putting workers on shorter work weeks or no-pay leave.⁷ This could occur as wage subsidies and other support may still be insufficient to cover revenue losses for some firms. Alternatively, some firms may ask workers to take cuts in pay. A decline in overall remuneration in some sectors could also occur through reductions in bonuses.

In the NWC's annual wage guidelines for 2020, the council urged firms to consider retrenchments only as a last resort. EPG's assessment is that, should government support be insufficient to offset business losses, both shorter working hours and pay reductions will likely occur in the first instance. The decline in the aggregate wage bill will thus, at least in the initial period, mainly be reflected as reductions in resident monthly wages. Econometric analysis confirms that Singapore's resident wages are indeed downwardly responsive to increasing labour market slack, which will help contain the extent of retrenchments.⁸ A recent survey conducted by Mercer Singapore has indeed found that 3% of the firms have cut staff salaries and another 5% were considering the option, while a lower 1% were contemplating retrenchments.⁹

⁶ Singapore Airlines has announced that it would provide at least 300 care ambassadors to help support the needs of the healthcare industry. Separately, the government has also eased regulations on foreign worker mobility, allowing employers to transfer excess foreign workers to other employers in the same sector, who are facing manpower shortages.

⁷ A study published on 30 March 2020 by The Chope Group and Professor Sherri Kimes of Cornell University School of Hotel Administration showed that 80% of F&B operators representing a total of 249 F&B establishments had reduced casual labour hours while one-third had imposed compulsory leave for full-time staff as part of cost-cutting measures. See The Chope Group and Kimes, S (2020), "How Restaurants Have Been Affected by COVID-19", March 30.

⁸ EPG's estimates of the wage Phillips Curve relationship in Singapore show that a 1% rise in the quarterly output gap is associated with approximately a 0.85% point rise in y-o-y resident wage growth, representing a stronger relationship between wage growth and labour market slack than in many advanced economies. For more details on the general methodology, see Box B in the October 2019 *Macroeconomic Review*.

⁹ The survey was conducted by Mercer Singapore between 9 March and 15 March 2020. 232 companies from a wide range of industries such as manufacturing, retail and wholesale trade, banking and energy took part in the survey.

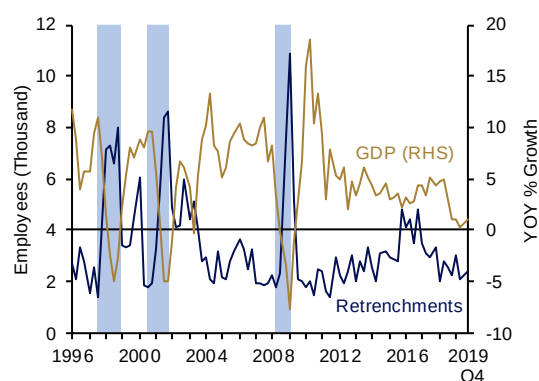
EPG's forecasting models at the industry level show that nominal wage declines are likely to occur swiftly and sharply in the transportation & storage and financial services industries, where remuneration is highly responsive to changes in business cycle conditions. Activity in the transportation & storage industry is expected to be most heavily impacted by the containment measures.¹⁰ The accommodation & food services industry is also projected to see significant monthly wage declines, driven by reductions in hours worked.¹¹ At the same time, the community, social & personal services (CSP) and financial services industries will contribute significantly to overall wage declines for 2020, given the high variable components in their remuneration. However, elevated demand for healthcare workers and increased bonuses given by the government to the healthcare sector should provide some support to wages in the CSP sector.

Nevertheless, retrenchments and unemployment are still expected to rise

Notwithstanding the large financial buffer provided by the government, as well as labour market adjustments on the intensive front, the large, abrupt shock to the Singapore economy is still likely to cause retrenchments and unemployment to rise (**Chart 3.7**). This non-linearity in the response of retrenchments to economic weakness occurs because of the cost of hiring and training workers. A more severe downturn is more likely to cause worker productivity to fall below these costs and thus result in an increase in separations. Similar to previous downturns, firms that were already in a weak financial position before the COVID-19 outbreak are more likely to retrench.

Chart 3.7 Retrenchments tend to rise only when economic conditions decline sharply

Total retrenchments and GDP growth

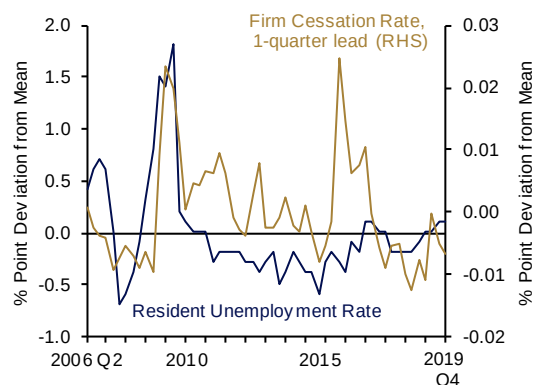


Source: DOS and MOM

Note: The shaded areas denote periods with a spike in retrenchments.

Chart 3.8 The expected rise in the unemployment rate could presage more firm cessations

Firm cessation rate and resident unemployment rate



Source: DOS, MOM and EPG, MAS estimates

¹⁰ For example, amid large reductions in capacity, Singapore Airlines has announced significant pay cuts and no-pay leave affecting around 10,000 staff.

¹¹ However, in these sectors, the average wage may rise in the near term if firms significantly reduce the use of part-time or short-term contract workers before reducing full-time employees. This happens because the wages of part-time or casual workers drop out of the reported data in the absence of any income for the month.

Overall, the combination of a pullback in hiring and rise in retrenchments will likely cause the resident unemployment rate to step up. However, a cyclical easing of the rate of resident labour force growth, on account of workers withdrawing from the labour force due to fewer job opportunities, will dampen part of the increase in the resident unemployment rate. Unemployment has historically led firm cessations in Singapore, with a rise in unemployment correlated with higher firm cessations one quarter later (**Chart 3.8**). This suggests that a spike in unemployment typically occurs only when firms are about to shut down. Thus, the government's aim of helping businesses survive through JSS cash grants and other measures should not only forestall a large spike in unemployment in the near term, but should also prevent spare capacity from emerging more broadly. It should also reduce the possibility of more lasting damage to the economy, which may arise through destruction of firm-specific organisational capital¹² as well as hysteresis effects that cause a rise in structural unemployment.

¹² Firm-specific capital, which includes customer or supplier networks, as well as internal systems, can be lost in bankruptcies. Aside from machines and workers, a large share of firms' value is connected to the nexus of relationships and practices that are specific to each firm. The loss of this intangible capital could reduce the potential of the economy and cause weaker labour outcomes in the longer run.

3.2 Consumer price developments

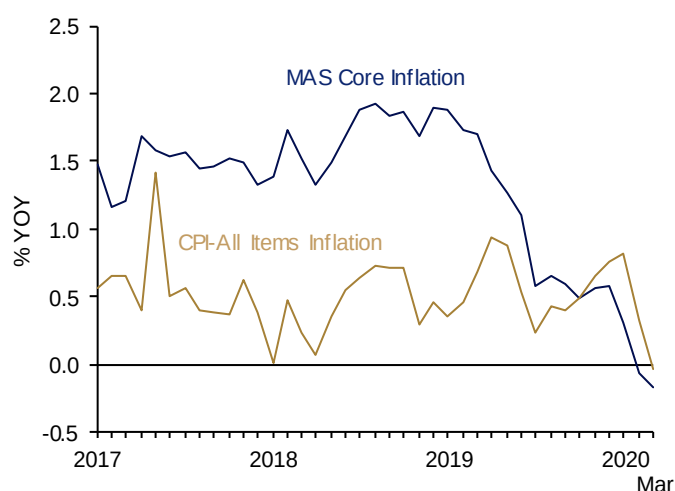
Core inflation fell in Q1 2020

The outbreak of COVID-19 began to have an impact on inflation towards the latter part of Q1 this year. MAS Core Inflation was 0% y-o-y in the first quarter, down from 0.5% in Q4 2019 (**Chart 3.9**). In January, part of the decline in core inflation was due to the rebasing of the CPI, as well as government measures to reduce the costs of living for households. In February and March, core inflation turned negative as the spread of COVID-19 worldwide led to a sharp drop in the prices of travel-related services. Increased outpatient subsidies as part of medical measures to combat the outbreak further dampened healthcare inflation from February. At the same time, social distancing measures began to weigh on point-to-point land transport and food services inflation, particularly in March.

On the external front, the plunge in global oil prices fed into lower domestic fuel prices in March. Car prices also saw smaller increases over Q1 as COE premiums fell and some dealers cut their margins. In comparison, accommodation inflation turned positive as housing rents stabilised. Overall, CPI-All Items inflation eased in tandem with core inflation to 0.4% y-o-y in Q1 2020, from 0.6% in Q4 last year.

Chart 3.9 Core and headline inflation weakened in Q1 2020

MAS Core Inflation and CPI-All Items inflation



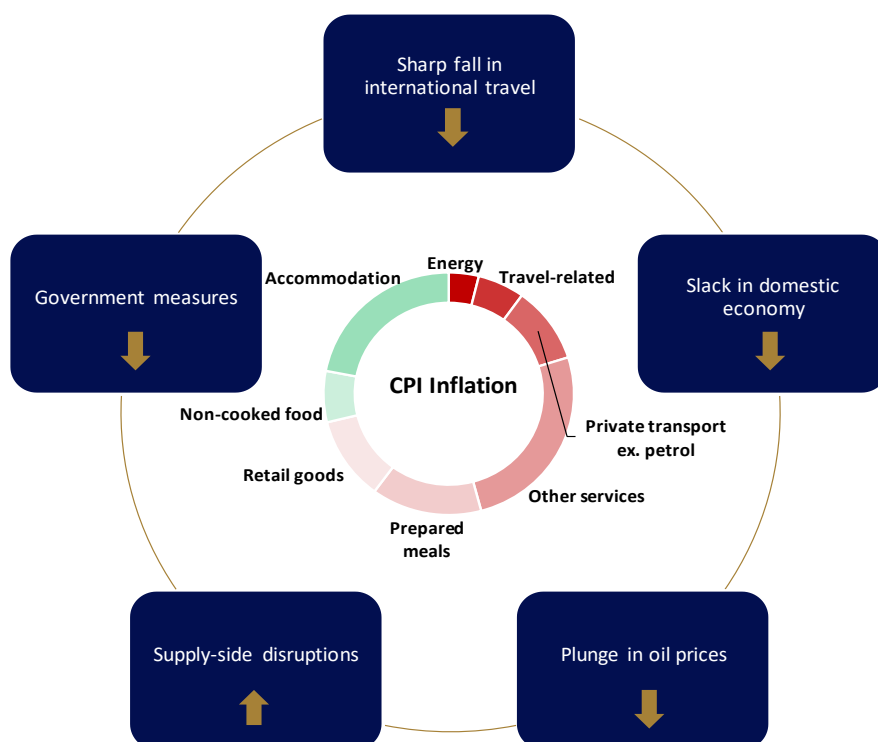
Source: DOS and MAS

Inflation will decline further as the impact of COVID-19 broadens

In the months ahead, prices of holiday expenses and airfares are likely to decline further as demand for international travel remains subdued. Price increases of other discretionary services such as restaurant food and recreational & cultural services are also likely to ease with extended social distancing measures and a weakening domestic labour market. While supply-side disruptions could push up imported food prices, the collapse in oil prices will filter through to reductions in electricity and gas tariffs. Overall, increases in domestic and international spare capacity will exert downward pressure on inflation in the near term. Both core and headline inflation measures are expected to turn negative in 2020, the first occurrence since 2002 (**Figure 3.1**).

Figure 3.1 The COVID-19 outbreak will be disinflationary

Overview of factors driving the change in inflation in 2020



Note: Segment sizes in the chart are proportionate to the weights of the components in the 2019 CPI. The colour intensity of the segments shows the extent to which inflation for each component is likely to change in 2020, with red representing categories that will see declines in inflation and green indicating categories likely to experience increases.

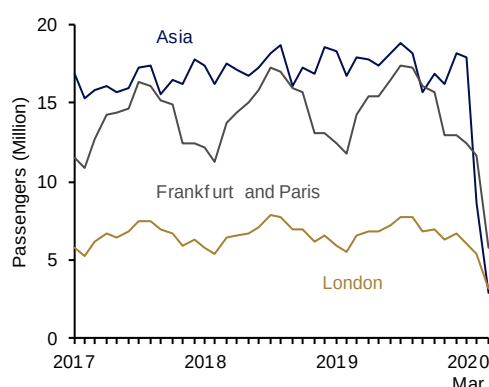
Prices of services related to outbound travel will fall further

Across the major categories in the CPI basket, travel-related items were some of the earliest to be affected by the global spread of COVID-19. Airport passenger volumes declined sharply in February and March as widespread restrictions on cross-border movements of people severely curtailed travel (**Chart 3.10**). Airfares and holiday expenses in Singapore's CPI basket, which were acutely affected by the reduction in international tourism, fell by 2.7% y-o-y and 1.3% respectively in the first quarter of the year (**Chart 3.11**).

Prices of travel-related services are expected to decline further and only recover slightly in Q4 2020. Travel restrictions in many countries may remain in place for an extended period. And, even if they were lifted, demand for business and leisure travel is unlikely to pick up strongly as weak global economic conditions linger. Overall, prices of travel-related services in the CPI are projected to exert a significant drag on core and headline inflation this year, after contributing positively to both measures in 2019.

Chart 3.10 Passenger movements in major air transportation hubs have plunged

Passenger movements at major air transportation hubs

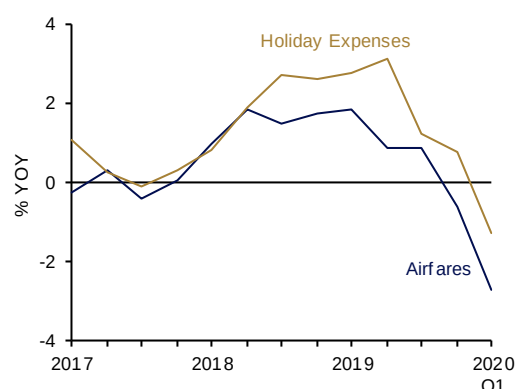


Source: Haver Analytics

Note: Asian air transportation hubs comprise South Korea Incheon Airport, Hong Kong International Airport and Singapore Changi Airport.

Chart 3.11 Prices of travel-related components fell steeply in Q1 2020

CPI components related to outbound travel



Source: DOS

Note: Holiday expenses CPI comprise package tours and spending on hotels and other related expenses.

Social distancing measures and weaker consumer sentiment will dampen inflation for prepared meals and retail goods

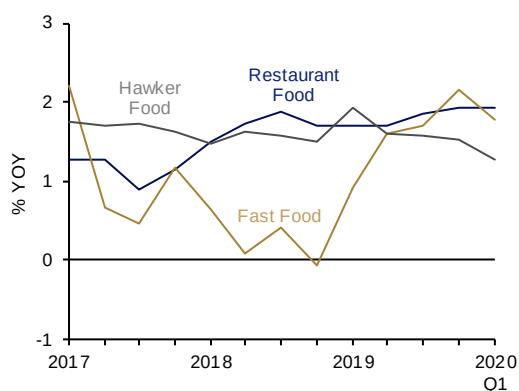
Prices of prepared meals and retail goods softened in Q1 alongside reduced footfall at eating establishments and shopping malls due to the introduction of social distancing measures to contain the COVID-19 outbreak. Prepared meals prices rose by a smaller 1.6% y-o-y in the first quarter after increasing by 1.8% in Q4 last year (**Chart 3.12**). Sales fell across all types of food and beverage establishments in February, with restaurants and food caterers experiencing sharper declines (**Chart 3.13**). Some restaurants consequently began to offer discounts and promotions to counter the slump in business. A poll of 174 restaurant operators conducted by The Chope Group, for example, showed that over 40% had started to offer discounts in February and March as a means of boosting sales.¹³

Inflation of prepared meals is expected to ease further amid the heightened social distancing measures and the weaker economic outlook. Restrictions on dining-in during the circuit breaker period will significantly affect sales in April and May, and likely have a further dampening effect on prices. Notwithstanding their greater online presence, restaurants could be more significantly affected as households also cut back on discretionary expenditure. Prices of hawker meals may be supported by the rise in the cost of non-cooked food items, although government subsidies for other operating expenses should cap the rate of price increases. For example, stallholders in hawker centres managed by the National Environment Agency (NEA) or NEA-appointed operators will receive rental waivers of up to three months as part of the Budget 2020 measures. Overall, inflation in food services is expected to come in lower this year, and contribute significantly to the decline in core inflation.

¹³ The Chope Group and Kimes, S (2020), "How Restaurants Have Been Affected by COVID-19", March 30.

Chart 3.12 Food services inflation slowed in Q1 2020

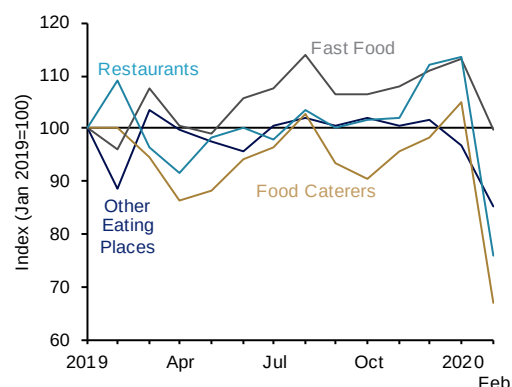
Inflation in components of the food services CPI



Source: DOS

Chart 3.13 Restaurant and food catering sales have plummeted since the COVID-19 outbreak

Food and Beverage Sales Index (Chained Prices)



Source: DOS

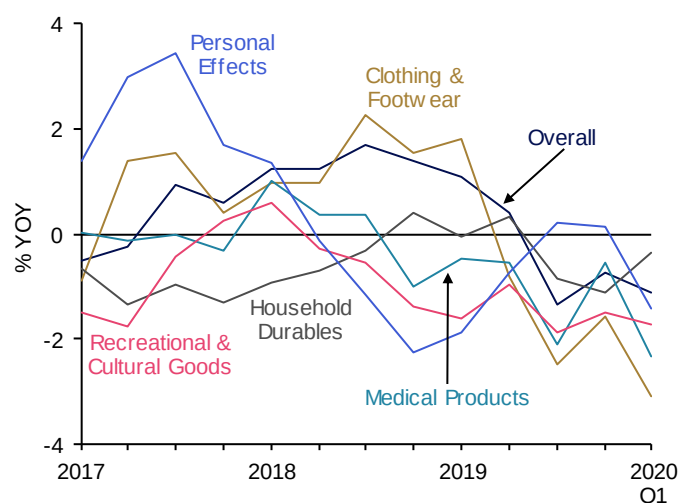
Note: "Other Eating Places" consists of food courts, coffee shops and eating houses, as well as other food and beverage establishments not elsewhere classified.

The cost of retail goods fell by 1.1% y-o-y in Q1 2020, steeper than the 0.7% drop in Q4 last year, and with price declines observed across most categories (**Chart 3.14**). This was due to weakness in retail sales, as the COVID-19 outbreak caused tourist arrivals to plummet and consumers to avoid malls and other shopping places.

Similarly, the outlook for the retail sector has weakened further owing to the impact of the more stringent circuit breaker measures and deterioration in labour market conditions. This should lead to more aggressive discounting, particularly for household durables, clothing & footwear and recreational & cultural goods. In comparison, prices of some essential household products and medical supplies could firm in the near term due to a combination of increased demand and supply-side constraints. On the whole, prices of retail items are expected to fall by more this year, after declining by 0.1% in 2019.

Chart 3.14 The decline in prices of retail goods in Q1 2020 was broad-based

CPI inflation of selected retail goods categories



Source: DOS

Note: "Clothing & Footwear", "Household Durables" and "Recreational & Cultural Goods" are classified either under "Services" or under "Retail & Other Goods" in the CPI, although they largely consist of retail items.

Oil prices fell sharply and are likely to remain low

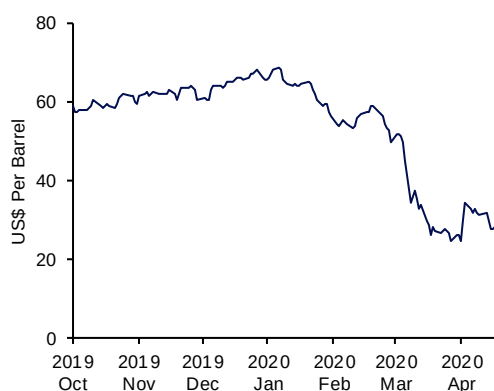
On the external front, oil prices have plummeted since the start of the year as measures to contain the pandemic weighed on global economic activity and severely curtailed international and domestic travel (**Chart 3.15**). Notwithstanding an OPEC+ agreement to cut output, the Brent crude benchmark fell by more than 70% from US\$66 per barrel at the start of the year, to under US\$20 per barrel on 21 April, the lowest level since 2002.

Persistent weakness in global demand and the likelihood of significant supply should keep oil prices low for an extended period. Brent crude oil prices are currently projected to average US\$36 in 2020, broadly in line with the level implied by the futures curve and 40% lower than the US\$64 in 2019. However, the disinflationary impact of falling oil prices will be less than before: a sizeable proportion of households have subscribed to fixed-rate electricity price plans under the Open Electricity Market, while the weight of energy in the CPI basket following the 2019 CPI rebasing has been reduced.¹⁴ Energy-related CPI components will subtract 0.4% point and 0.3% point from headline and core inflation in 2020, respectively (**Chart 3.16**).

¹⁴ Energy-related items, which include motor fuels and fees paid by households for electricity and gas, accounted for 3.9% of the CPI basket in 2019 after the rebasing, compared to 5% in the 2014-base year CPI.

Chart 3.15 Oil prices have fallen significantly on weak demand

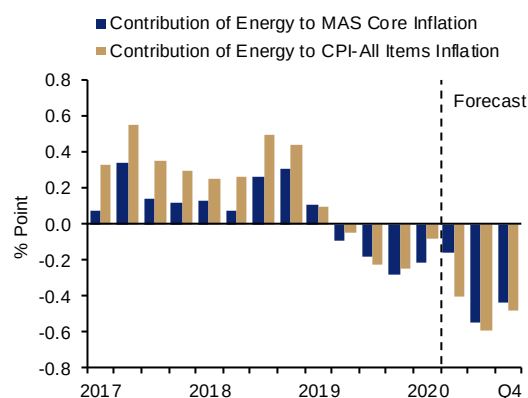
Dated Brent crude oil prices



Source: Financial Times and Haver Analytics

Chart 3.16 Energy-related CPI components will contribute negatively to inflation in 2020

Contributions to year-on-year inflation



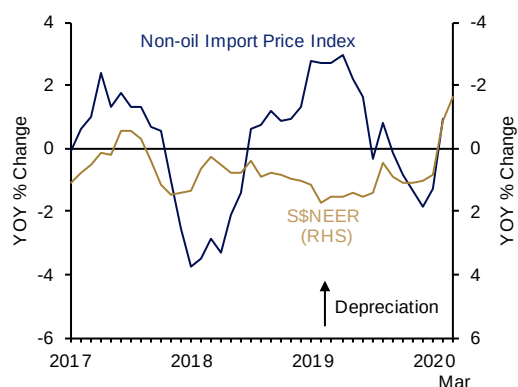
Source: DOS and EPG, MAS estimates

Non-oil import prices picked up in part due to supply-side disruptions

Following the 1.4% y-o-y drop in Q4 2019, non-oil import prices continued to fall by 1.3% in January this year, before rising by 0.8% in February. This increase was broad-based, partly reflecting the depreciation of the S\$ and possibly temporarily higher freight costs as shutdowns in countries affected by COVID-19 disrupted supply chains (**Charts 3.17 and 3.18**). Air freight rates rose significantly with the reduction in air cargo capacity due to widespread flight cancellations.¹⁵ Delays and higher freight costs were initially reported on some major shipping routes, but freight costs have since declined on the whole.

Chart 3.17 Recent S\$ weakness contributed to the increase in non-oil import prices

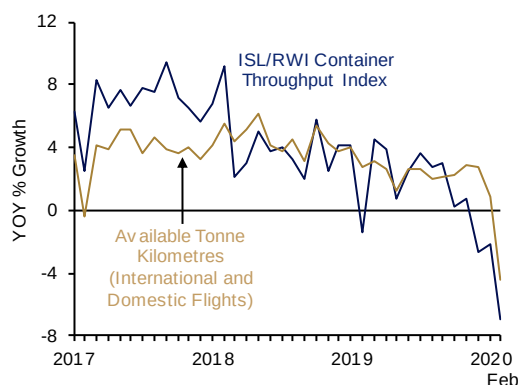
Non-oil import price index and S\$NEER (inverted scale)



Source: DOS and MAS

Chart 3.18 Shutdowns sharply reduced air cargo capacity and container throughput

Measures of air freight capacity and container throughput



Source: International Air Transport Association (IATA), Institute of Shipping Economics and Logistics/Leibniz Institute (ISL/RWI) and Haver Analytics

Note: Available tonne kilometres are calculated by multiplying the number of tonnes of capacity available for carriage of passenger and cargo loads on aircraft by distances flown in kilometres.

¹⁵ Freed, J (2020), "Air freight rates skyrocket amid passenger flight cuts, Chinese factory restarts", *Reuters*, March 11.

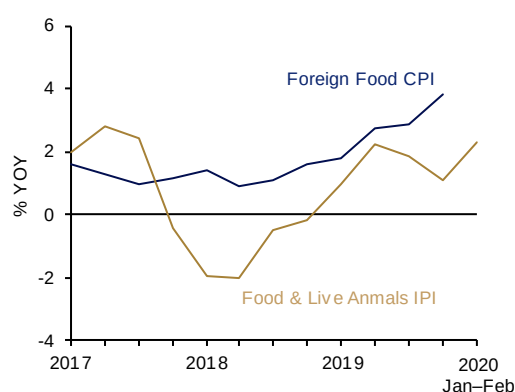
Food prices could see some upward pressure in the near term due to supply chain disruptions

The increase in non-oil import prices was also evident in foodstuffs. Food import prices rose by an average of 2.3% y-o-y over January and February 2020, compared to the 1.1% rise in Q4 2019. This was broadly in line with food inflation trends in Singapore's largest food import sources (**Chart 3.19**). Looking ahead, even as increases in global food commodity prices have fallen (**Chart 3.20**), restrictions on the movement of goods and people have affected food production and distribution networks in certain food exporting economies. These disruptions have disproportionately impacted perishable food items that are labour-intensive to produce¹⁶ and could lead to supply shortages. Consumer stockpiling of foodstuffs in some countries has also pushed up the prices of selected food commodities, such as rice and wheat.¹⁷

Inflation in non-cooked food items in Singapore is expected to rise temporarily in the coming months, reflecting the pass-through from higher food import prices and supply disruptions in some food commodity markets. Prices of non-cooked food items are projected to see a slightly larger increase in 2020, after rising by 1.1% in 2019. Dislocations in food supply chains are a key source of upside risk to the outlook for food prices given Singapore's dependence on food imports. Shortages of particular food items could emerge in the event that large food-exporting countries restrict exports to preserve supplies for domestic needs or move to stockpile food aggressively, which would cause inflation in non-cooked food items to accelerate.

Chart 3.19 Food import prices picked up in February, in line with trends abroad

Foreign food CPI and Singapore's Import Price Index (IPI) for Food & Live Animals

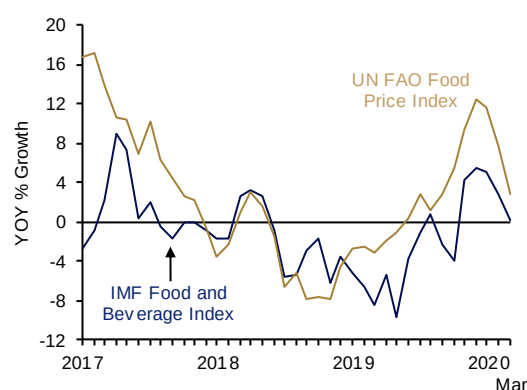


Source: DOS, Haver Analytics and EPG, MAS estimates

Note: Foreign food CPI inflation is the average of inflation rates for food in Singapore's ten largest food import source countries, weighted by their shares in Singapore's nominal food imports. These countries collectively accounted for around 72% of Singapore's food imports in 2018.

Chart 3.20 Global price inflation of food commodities have declined

Global food price indices



Source: IMF and UN Food and Agriculture Organization (FAO)

¹⁶ Cullen, M T (2020), "COVID-19 and the risk to food supply chains: How to respond?", UN Food and Agriculture Organization, March 29.

¹⁷ IMF (2020), "The Great Lockdown", *World Economic Outlook*, April 2020, pp. 17–19.

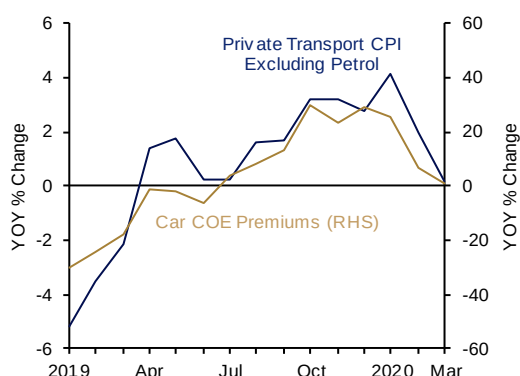
Private transport costs are anticipated to fall this year due to weaker demand for cars

Excluding petrol, private road transport costs picked up by 2.1% y-o-y in Q1 2020, compared to the 3.0% rise in the preceding quarter, mainly due to a smaller increase in the prices of new cars (**Chart 3.21**). Notably, COE premiums for cars fell to a 12-month low of \$32,000 in February and stayed at a similar level in March. The lower COE premiums came on the back of weaker car sales and bidding activity in recent months. Private-hire companies have pulled back on fleet expansion plans as fewer people commute for work and leisure, while heightened social distancing measures have shuttered car showrooms, affecting sales at dealerships.

In the months ahead, households are likely to defer spending on big-ticket items given heightened uncertainty and the weak economic outlook. At present, the suspension of COE tenders during the circuit breaker will prevent a collapse in COE premiums in these weeks. However, premiums are still expected to fall later in the year, although the extent of decline should be tempered by reduced car COE quotas amid a fall in car de-registrations (**Chart 3.22**). Overall, excluding petrol, private transport costs are expected to fall in 2020 compared to the previous year.

Chart 3.21 Car prices rose by less in Q1 as COE premiums trended lower

Private transport CPI excluding petrol and car COE premiums

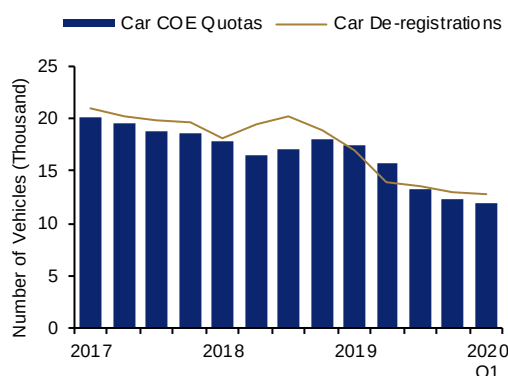


Source: DOS, LTA and EPG, MAS estimates

Note: Car COE premiums refer to the average of COE premiums for Category A and Category B vehicles weighted by their shares of COE quotas in each tender.

Chart 3.22 COE quotas have fallen in line with declines in car de-registrations

Car de-registrations and COE quotas



Source: LTA

The weaker economic outlook will cap the increase in housing rents

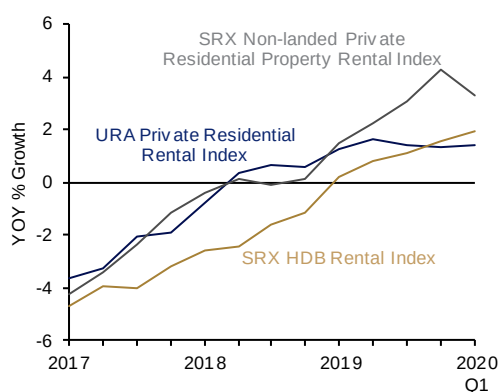
Accommodation inflation rose to 0.4% y-o-y in Q1 2020, turning positive for the first time since Q2 2014 as housing rents stabilised. While rental growth for private non-landed residential property eased towards the end of 2019, HDB rents picked up at a faster pace over the same period (**Chart 3.23**).

From Q2 onwards, the sharp drop in economic activity will likely begin affecting leasing demand from non-residents. However, tighter housing supply is expected to offset part of the downward pressure on housing rents. Additions to the private housing stock have tapered, pushing vacancy rates down to their lowest level since 2013 (**Chart 3.24**), while the number

of HDB units that will become eligible for leasing is estimated to fall in 2020 compared to 2019. Accommodation costs as a whole are thus expected to remain stable in 2020 after declining by 0.9% last year.

Chart 3.23 The rate of increase in private housing rents has slowed

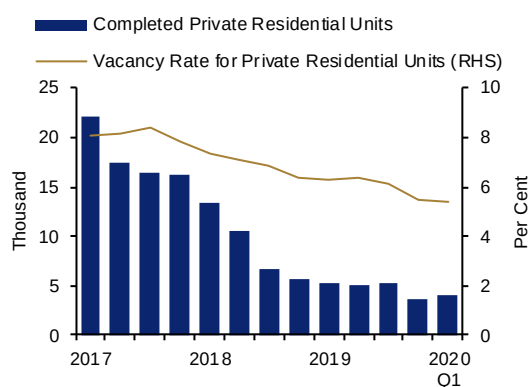
Measures of market rentals



Source: URA and SRX

Chart 3.24 Additions to the private housing stock have tapered off, pushing vacancy rates lower

Year-on-year change in completed private residential units and vacancy rates



Source: URA

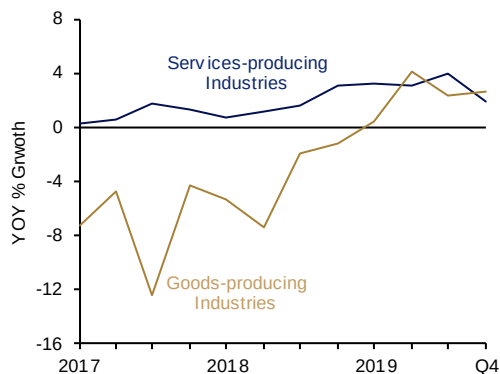
Note: Excludes executive condominiums.

Rising spare capacity will dampen domestic cost pressures

Domestic cost pressures had already shown some signs of moderating in Q4 last year. Growth in unit labour cost (ULC) in the services-producing industries slowed to 1.8% y-o-y in Q4 2019, while that for goods-producing industries held steady at 2–3% over the past two quarters (**Chart 3.25**). The expected rise in labour market slack will dampen labour cost increases in the near and medium term.

Chart 3.25 Growth in unit labour costs slowed in the services-producing industries

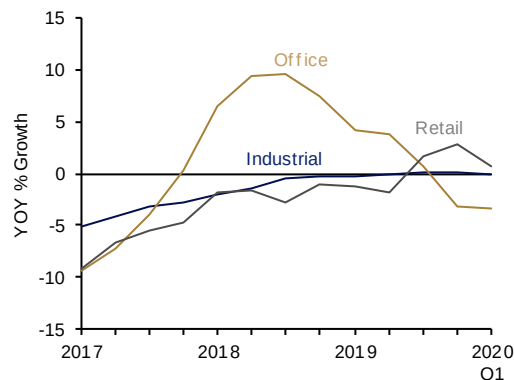
Unit labour cost indices for goods- and services-producing industries



Source: DOS

Chart 3.26 Office rents declined, while retail rents rose at a slower pace

Commercial and industrial rental indices



Source: JTC and URA

Meanwhile, office rents dropped by 3.3% y-o-y in Q1 2020, extending the decline in Q4 2019, while increases in retail rents also eased in Q1 2020 (**Chart 3.26**). Rents could fall further as the weak business environment dents leasing demand and the retail sector comes under significant pressure. Nevertheless, businesses will receive some relief on rental costs. Budget 2020 and its supplements will provide property tax rebates to landlords that, under a new Bill, have to be passed on to tenants. Other forms of support from landlords, such as temporary changes to rental payment structures to account for losses of tenant revenues, will also help to reduce rental costs.

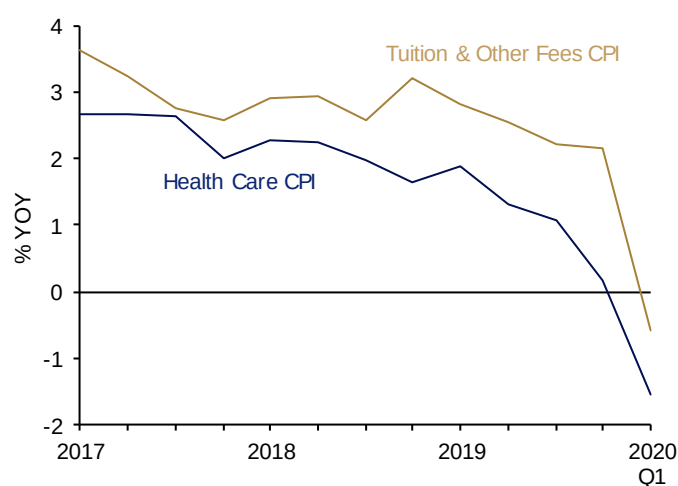
On the whole, business cost pressures are expected to remain subdued in 2020, reflecting weak demand in domestic factor markets and an attendant rise in un-utilised capacity.

Government measures for households will further lower inflation

Measures announced by the government last year and in Budget 2020 to reduce households' healthcare and education costs will lower inflation in 2020.¹⁸ As part of its COVID-19 response measures, the government introduced subsidies for the treatment of respiratory illnesses at polyclinics and some general practitioner clinics from mid-February. These are expected to be kept for the whole of this year, and will result in a substantial reduction in healthcare services costs. Prices of healthcare and education services fell in February and March (**Chart 3.27**) and are projected to subtract 0.1% point and 0.2% point respectively from both headline and core inflation in 2020.

Chart 3.27 A number of government measures have lowered healthcare and education services fees

CPIs for Health Care and Tuition & Other Fees



Source: DOS

Note: Health Care CPI includes the "Medicines & Health Products" category, which is classified under "Retail & Other Goods". Healthcare services, which consist of outpatient services, hospital services and health insurance fees, account for the bulk of the weight of the Health Care CPI in the 2019-base year CPI basket.

¹⁸ These include healthcare subsidies under the Merdeka Generation Package and enhancements to the Community Healthcare Assistance Scheme. Measures affecting education include enhancements to preschool subsidies, fee subsidies for National Institute of Technical Education Certification (Nitec) and Higher-Nitec students as well as the lowering of tuition fees at the Singapore Institute of Technology and Singapore University of Social Sciences. The one-year freeze in government fees and charges announced in the Resilience Budget will apply to fees at polytechnics and Institutes of Technical Education. Local autonomous universities have also deferred fee increases in 2020.

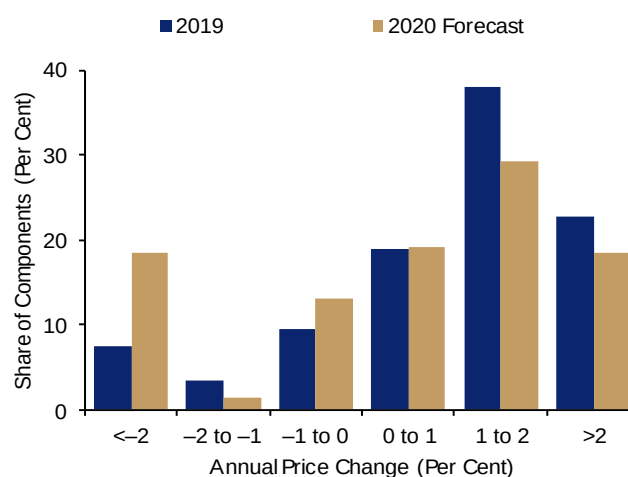
All in, both core and headline inflation are expected to be negative this year

The COVID-19 pandemic and government measures to contain its spread have resulted in both aggregate demand and supply falling. While supply-side disruptions could cause some increase in the prices of certain goods and services, the average price level is expected to decline over the year. This predominantly reflects the rise in spare capacity domestically and abroad and arises as households boost precautionary savings by cutting back on spending on discretionary goods and services. In this recession, it may also reflect the fact that certain currently unavailable goods and services are not substitutable and consumers choose not to spend more on available goods and services.

Overall, disinflationary pressures are expected to broaden in the economy. The proportion of items in the core CPI basket experiencing annual price declines is anticipated to rise to slightly more than 30% in 2020 from 20% in 2019 (**Chart 3.28**). The distribution of annual price changes in the core CPI basket is also likely to see a significantly fatter left tail, as the share of items with price declines of more than 2% is projected to more than double to 18% of the basket in 2020, from 7% last year. As a result of the sharp relative price changes in the economy, a bimodal distribution for price changes could emerge this year, with inflation in essential goods and services continuing to cluster around 1–2%, while discretionary goods and services register price declines of more than 2%.

Chart 3.28 The distribution of annual price changes of the core CPI basket will shift left, with a larger proportion of the basket expected to see greater price declines in 2020

Distribution of annual price changes in the core CPI basket



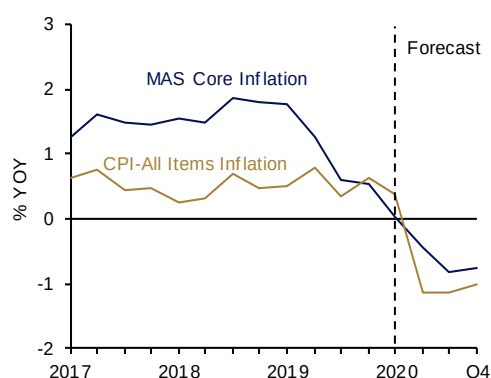
Source: EPG, MAS estimates

Note: Estimated using the most disaggregated CPI components available, and their weights in the 2019-base year CPI basket. There are a total of 195 components. Two were excluded as they were only introduced in the 2019-base year CPI and hence their annual price changes in 2019 were unavailable.

Core inflation is anticipated to come in between -1 to 0% for 2020 as a whole. With the exception of food prices, all major components of MAS Core Inflation are expected to see price declines in 2020. In particular, the cost of services will fall, compared to the 1.6% increase in 2019. Over the year, core inflation is projected to reach a low in Q3, and only broadly stabilise in Q4 (**Chart 3.29**). Meanwhile, lower car and petrol prices will also pose a drag on the CPI and cause headline inflation to fall more sharply than core inflation (**Chart 3.30**). Headline inflation is similarly expected to average -1 to 0% in 2020.

Chart 3.29 MAS Core Inflation expected to reach a low in Q3 and average -1 to 0% this year

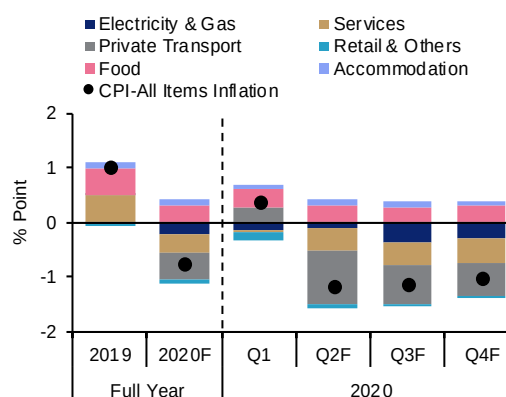
MAS Core Inflation and CPI-All Items inflation projections



Source: DOS and EPG, MAS estimates

Chart 3.30 Only food and accommodation will contribute positively to overall inflation in 2020

Contributions to year-on-year inflation



Source: DOS and EPG, MAS estimates

Box B: An Analysis of Crisis Wage Support Schemes in Singapore

Introduction

The Singapore government's three Budgets for FY2020 contain several targeted measures aimed at helping firms weather short-term reductions in cash flow arising from COVID-19. Among the most significant is the Jobs Support Scheme (JSS), a government-sponsored programme that will fund a significant portion of firms' wage bill on resident workers for nine months.¹ Companies in the most heavily affected industries such as food services, travel, tourism and accommodation will receive grants totalling 50–75% of the monthly wage for each resident employee, while all other industries will receive 25% in wage support for each resident employee. In addition, enhanced support will be provided for April and May 2020, when firms in all sectors will receive 75% of the monthly wage as many workplaces will be closed temporarily. For all sectors, the support is provided on the first \$4,600 of monthly wages for each employee per month, the median monthly wage.

The JSS has two key objectives: first, to minimise firm closures as a result of the pandemic and second, to forestall significant retrenchments. In effect, the JSS is a temporary wage subsidy for firms, which has two important economic implications. First, by reducing total costs of production, the wage subsidy can ease cash flow difficulties for firms when revenues decline sharply, helping to avoid shutdowns. Second, by reducing the marginal cost of labour for firms, the JSS reduces the incentive for firms to retrench workers. To encourage firms to retain workers, JSS funding will be spread out across four payments in April, May, July and October 2020, with firms receiving subsidies only for workers on their payroll in the qualifying periods.

The JSS is, in many respects, similar to other wage subsidy or cost saving schemes that the Singapore government has rolled out in past economic downturns. During the SARS episode, the government announced a 3% point cut to employers' CPF contributions. In the aftermath of the Global Financial Crisis of 2008, the Jobs Credit Scheme (JCS) gave employers a cash grant of 12% of monthly wages for each resident worker, up to a wage of \$2,500. All three schemes effectively lower wage costs for firms.

Building on previous work by Hoon (2014) and MAS (2009) that investigates countercyclical effects of Singapore's wage subsidy policies, this Box will analyse the three schemes along several dimensions: the quantum of the wage subsidy or saving; timing with respect to shortfalls in cash flow; and efficacy, i.e., whether the most affected sectors and firms will receive higher subsidies.

Quantum of wage support

To gauge the size of cost savings under the JSS relative to earlier wage support schemes, the average savings for firms as shares of their resident wage bill on a monthly and annual basis are calculated. The monthly savings are an indication of the short-term cushion to ease cash flow constrictions, while the annual savings suggest the potential for more sustained cost savings for firms, which may affect hiring or investment incentives in the

¹ The wage support per firm will be calculated based on wages paid in Oct–Dec 2019, as well as Feb–Jul 2020, totalling nine months of wage support.

longer term. The following equation is used to calculate the size of savings, or the effective subsidy, for each scheme.

$$\begin{aligned} \text{EffectiveSubsidy} = & \text{EmpShareCapped} \times \text{Subsidy} \times \text{WageCap} \\ & + (1 - \text{EmpShareCapped}) \times \text{Subsidy} \times \bar{W}_{<\text{WageCap}} \end{aligned} \quad (1)$$

The average subsidy for workers earning above the wage cap is $\text{Subsidy} \times \text{WageCap}$, the product of the per-employee subsidy and the wage cap. The average subsidy for workers earning under the wage cap is $\text{Subsidy} \times \bar{W}_{<\text{WageCap}}$, where $\bar{W}_{<\text{WageCap}}$ is defined as the average wage for workers earning less than the wage cap. In Equation 1, the average effective subsidy for firms can be calculated as the weighted average of $\text{Subsidy} \times \text{WageCap}$ and $\text{Subsidy} \times \bar{W}_{<\text{WageCap}}$, weighted by the share of employees earning more than the wage cap, EmpShareCapped , and the share of workers earning less than the wage cap, $(1 - \text{EmpShareCapped})$.

MOM data from the Comprehensive Labor Force Survey is used to estimate EmpShareCapped and $\bar{W}_{<\text{WageCap}}$. **Table B1** shows estimates of the average monthly and annual percentage savings on the average resident wage bill for firms.²

Table B1 Size of effective wage subsidies

	SARS CPF Contribution Cut	GFC Jobs Credit Scheme	COVID-19 Jobs Support Scheme
Per employee subsidy	3%	12%	25–75%
Effective subsidy, monthly	2.3%	6.4%	April and May: 38.6% Other months: 17.5%
Effective subsidy, annual	2.3%	6.4%	16.7%

Notes: Effective subsidies for the JSS for all months other than April and May 2020 are an employment-weighted average of subsidies for Tier 1, Tier 2 and all other sectors. Tier 1 sectors comprise mainly food services, while Tier 2 sectors comprise air transport and other tourism-dependent sectors.

Table B1 shows that on an aggregate basis, the JSS offers a significantly larger wage subsidy than those offered during the SARS outbreak and the GFC. On average, firms will receive funding for 38.6% of their resident employee wage bill in April and May, 17.5% for the other seven months, and 16.7% on a full-year basis (twelve months). On a monthly basis, the wage subsidy for firms in April and May is a twofold increase in the monthly subsidy for the other seven months of the JSS, which is itself more than twice the size of the monthly JCS subsidy, and five times that of the CPF rate cut. As both the JCS and CPF cut offered wage support for at least twelve months, the annual subsidy is equal to the monthly subsidy. In comparison, the JSS is expected to apply for nine months, implying that the annual subsidy is lower than the monthly subsidy. Nevertheless, the annual subsidy under the JSS is still substantially higher than for the other two schemes.

² The share of workers earning above the wage cap as well as the average wage for workers under the wage cap, are estimated using data from the Comprehensive Labour Force Survey on resident employment by monthly income in June 2018. For the CPF contribution cut, the wage cap is the CPF contribution ceiling in 2003.

Timeliness

For a wage subsidy to be effective in helping firms avoid liquidity constraint-induced shutdowns, disbursements should be made when these problems are most severe. **Table B2** displays the date for the trough of each downturn considered and its corresponding annualised q-o-q GDP growth rate, which serves as a proxy for the period in which liquidity constraints are most binding, as well as the month of first disbursement for each scheme and q-o-q GDP growth rate in the implementation quarter.

Table B2 Timing of disbursements

	SARS CPF Contribution Cut	GFC Jobs Credit Scheme	COVID-19 Jobs Support Scheme
Recession trough month	June 2003	Oct 2009	NA
GDP growth at trough (% annualised q-o-q)	-1.37	1.61	NA
Month of first payment	Oct 2003	Mar 2009	Apr 2020
GDP growth in quarter of implementation (% annualised q-o-q)	2.83	-2.56	-10.6

Notes: Since GDP growth for Q2 2020 is unknown, annualised q-o-q GDP growth for Q1 2020 from the *Advance Estimates* is shown here. Recession trough months are from Loh *et al.* (2011).

Table B2 shows that the CPF cut was implemented when the economy was already recovering (GDP growth in Q4 2003 turned out to be 2.8% q-o-q).³ In comparison, the first payment for the JCS was made in March 2009, in a quarter when Singapore's GDP contracted on a q-o-q basis, and about six months before GDP hit its trough. This suggests that the JCS was implemented in time to help cushion the impact of revenue contractions and ease liquidity constraints. While it cannot be determined at this point the period in which GDP will trough in the current crisis, the first payment in April 2020 will be made immediately after Singapore's GDP contracted sharply in Q1, by 10.6% on an annualised q-o-q basis. The advance GDP data suggest that COVID-19 has already impacted firm revenues, and the effect will be compounded in April and May by the sharp contraction of business activity in most sectors due to the government's circuit breaker measures. Hence, the enhanced JSS disbursement in April, May and subsequent months will likely prove to be more timely than the CPF contribution cut, and almost as timely as the JCS, in alleviating firms' cash flow bottlenecks.

Efficacy

For a wage support scheme to be effective in achieving its objectives, it should grant proportionately larger wage subsidies to firms whose revenues are most affected in the downturns. The JSS differs from the other two wage support schemes in that ex-ante, it was

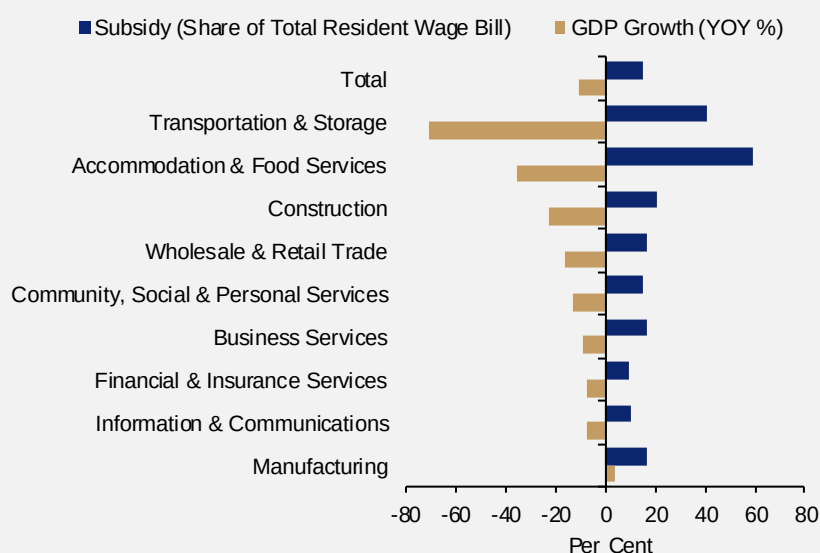
³ However, the resident unemployment rate continued to rise in the second half of 2003.

evident that the COVID-19 would impact certain sectors much faster and by much more than others—aviation and tourism, and to a lesser extent food and beverage. Accordingly, the JSS was designed to provide relatively higher subsidies to sectors designated as Tier 1, comprising mainly food services, which will receive 50% of wage funding for each resident employee, while Tier 2 sectors, comprising air transport and other tourism-dependent sectors, will benefit from 75% funding. Thus, the JSS allows for sectoral differentiation even while providing meaningful support to the broader economy.

Aside from the practical consideration of putting an upper limit on government outlays for any programme, the inclusion of a wage cap in all three schemes implies that sectors and firms that employ a larger share of lower-wage workers would receive higher effective subsidies. This is because firms would receive a lower effective subsidy for employing workers who earn more than the wage cap, as a share of monthly wages, compared to workers earning under the wage cap.

To obtain an indication of whether industries which experienced the most severe demand contractions will receive larger subsidies, estimates of the wage bill subsidy, expressed as a percentage of the industry's total resident wage bill, are compared with the industry's output growth in the quarter prior to subsidy implementation (**Chart B1**). Industry wage bill subsidies are calculated using the industry level equivalent of Equation 1. This is computed only for the JSS, as the data required for estimating industry level wage subsidies for the other two schemes are not available.⁴

Chart B1 Estimated JSS wage support and GDP growth in quarter before disbursement by industry



Source: DOS, MOM and EPG, MAS estimates

⁴ Specifically, data on employment by monthly income at the industry level is unavailable.

As a percentage of the resident wage bill, the JSS will provide a larger average monthly subsidy to accommodation & food services and transportation & storage industries, relative to the rest of the economy (**Chart B1**).⁵ The two sectors receiving the largest subsidies are also the sectors that have suffered the most severe contractions in Q1 2020, showing that the JSS is effective in providing more support to the most affected sectors. The larger subsidies for these sectors is due to a combination of the aforementioned two factors: higher per employee subsidies for Tier 1 and Tier 2 sectors, as well as a larger share of workers earning less than the wage cap.

Sum-up

The preceding analysis shows that the JSS is sizeable, timely and targeted. Each of these three features will contribute importantly to the JSS achieving its two key objectives: to minimise firm closures and dampen the rise in unemployment.

With regards to minimising firm closures, the important metric is the extent to which the JSS will help firms make payments on outstanding liabilities in the face of cash flow difficulties. In this regard, providing the most severely affected firms a larger buffer, at a time when their cash flow problems are most severe, will be important. From a macroeconomic perspective, minimising firm closures will in turn reduce the search costs associated with unemployed workers having to find new jobs, the destruction of accumulated organisational capital and the risk of financial sector contagion when loan defaults rise.

Apart from mitigating the rise in unemployment, the JSS will also have broader countercyclical stimulus effects. By incentivising firms to retain workers and continue paying their wages, the JSS supports personal incomes and enables households to maintain an acceptable level of consumption expenditures. Hence, the scheme will help to support aggregate demand and GDP growth in Singapore.

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⁵ The monthly subsidy by industry is calculated as the average across the nine months the JSS will be applicable, taking into account higher monthly subsidies for all sectors in April and May 2020.

4 Macroeconomic Policy

- The COVID-19 pandemic and efforts to contain its spread have severely disrupted economic activity around the world. The Singapore economy will contract in 2020, causing an emergence of slack in the domestic labour market. Core inflation will turn negative as domestic cost pressures ease and external inflation stays subdued.
 - In its April 2020 Monetary Policy Statement, MAS set the rate of appreciation of the S\$NEER policy band to zero per cent per annum, starting at the prevailing level of the S\$NEER. This policy stance affirmed the level of the trade-weighted nominal exchange rate, which was slightly below the mid-point of the policy band, and will ensure medium-term price stability. MAS also increased liquidity to the financial system, relaxed regulatory requirements for banks and eased credit conditions for businesses and households in collaboration with the financial industry.
 - Fiscal policy will play the primary role in mitigating the impact of the recession. The fiscal impulse from the combined Budget measures is the most expansionary on record. These measures will provide immediate financial relief to businesses and households, with the most severely affected sectors and vulnerable households receiving more assistance. The government also introduced unprecedented support for the self-employed and middle- and lower-income workers who were retrenched.
 - Taken as a whole, the timely and concerted support from monetary, financial, fiscal and regulatory policies will ease the economic cost of the pandemic. They will help prevent a severe, temporary shock from imparting a deeper and longer-lasting imprint on the economy.
-

4.1 Monetary Policy

MAS reduced the slope of the policy band slightly in October 2019

At the time of the October 2019 policy review, global growth momentum was still on a downward trend. Manufacturing and trade were in an extended downturn, with policy uncertainty accentuating the pullback in global electronics and automobile demand. A number of Singapore's major trading partners eased monetary and fiscal policy in response, but the risk remained that weakness in manufacturing would spill over into services more materially. This would cause a deterioration in labour markets, thus further slowing private consumption and global economic growth.

Against this backdrop, the forecast in October was for activity in the Singapore economy to enter an extended trough. Over H2 2019 and 2020, GDP would grow modestly, underpinned by expansions in the modern services and domestic-oriented clusters. However, the overall recovery would be hesitant, as the trade-related sector remained vulnerable to external volatility. Overall, a small negative output gap would open up in 2019 and widen in 2020.

Some degree of slack in the domestic labour market would emerge and wage growth would ease in 2019 and 2020. The softening labour market and weak consumer sentiment, in turn, would reduce the ability of firms to raise prices, even as various business costs were likely to moderate. External sources of inflation were also anticipated to be subdued, with global food and oil prices held in check by lacklustre global demand and ample supply.

MAS Core Inflation was therefore forecast to stay below its historical average in 2019 and 2020. As disinflationary forces were not expected to be entrenched, core inflation would rise gradually over the medium term, in line with the stabilising growth profile. Accordingly, even as downside risks to growth and inflation remained, MAS assessed that a measured easing of the monetary policy stance, effected through a slight reduction in the slope of the policy band, would be sufficient to ensure medium-term price stability.

The Singapore economy will enter into a recession this year

In late January and February 2020, the sudden outbreak of COVID-19, first in China, and then in the region, including Singapore, dealt a blow to the recovery which had hitherto appeared to be taking hold. The escalation of the outbreak into a global pandemic in March and the measures taken by governments to contain its spread have resulted in the largest negative shock to the world economy since the Great Depression. Notably, the impact on economic activity from simultaneous declines in demand and supply is an unavoidable consequence of the necessary public responses to the health crisis.

Looking ahead, even if aggressive containment measures succeed in lowering the rate of infection, global economic growth is likely to remain weak beyond the first half of 2020. This partly reflects the staggered manner in which COVID-19 has spread. While a recovery in China appears to be underway and daily new cases in several European countries have moderated, the US is still close to the peak of the infections curve and developing economies could yet see major outbreaks. Moreover, some containment measures, such as travel restrictions, could remain in place even after infections ease, and curtail the pace of the global economic recovery.

Global GDP will fall in H1 before picking up gradually from Q3. For the year as a whole, growth in Singapore's major trading partners is projected to come in at -2.7%, substantially down from a positive 3.1% in 2019. However, this forecast is highly uncertain and a decisive recovery in the global economy will only take place when the pandemic has run its course or a medical breakthrough, such as the production of a vaccine, is made.

The Singapore economy shrank by 2.2% y-o-y in Q1 2020 when the first wave of outbreaks occurred across the region and governments began imposing containment measures, including in Singapore. This marked the first time the domestic economy has contracted since the GFC. The pullback was most evident in the aviation and tourism sectors, but weakening consumer confidence and the introduction of social distancing measures had also begun to weigh on the consumer-facing industries. Construction activity moderated due to interruptions to the inflow of foreign workers and intermediate inputs, while global supply chain disruptions similarly affected the trade-related sector. On a sequential basis, GDP declined by 10.6% q-o-q SAAR.

The Singapore economy will enter into a recession in 2020. GDP growth is projected at this stage to come in at -4 to -1% this year, with downside risks. The severe deterioration in the outlook for the global economy, and investment in particular, will dampen activity in Singapore's trade-related sector. The sharp decline in global oil prices will lead to weakness

in some oil-related manufacturing and services segments, while tighter financial conditions and the overall poorer economic climate will depress growth in the modern services sector more broadly. Most consumer-facing industries will contract in the near term, particularly during the circuit breaker period, and would likely remain subdued for some time in view of the weaker labour market. As social distancing measures are unlikely to be fully lifted even after the circuit breaker period is over, activity in a range of sectors will likely stay muted for some time.

Labour market conditions will weaken and core inflation will decline

Singapore's resident unemployment rate will rise this year. Employment prospects, which were already softening prior to the outbreak of COVID-19, will worsen as most firms cut back sharply on hiring. Shortened working hours and pay cuts will bear some of the adjustment to lower labour demand and help keep workers employed. At the same time, the government's fiscal support packages will defray a considerable proportion of firms' wage bills and reduce the incidence of job losses. However, retrenchments are still expected in some struggling industries and as weaker firms close. Wage growth will decline across most sectors of the economy and the overall resident wage is projected to fall. The commercial and retail property markets will similarly experience some expansion in spare capacity, thus keeping rentals subdued. Taken together, domestic costs and price increases are likely to ease.

Meanwhile, imported inflation is expected to moderate amid the significant downturn in global economic activity. Benchmark oil prices are forecast to stay low on lacklustre demand. Global food supplies are ample, although supply chain disruptions arising from international containment measures could put temporary upward pressure on the prices of some imported food items.

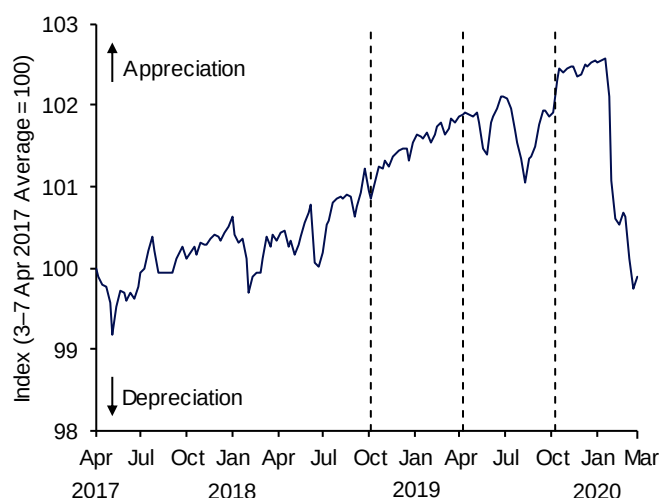
All in, MAS Core Inflation is projected to average between -1 and 0% in 2020 given the increased slack in the domestic economy. Firms' ability to raise prices will be constrained by weak employment outcomes and downbeat consumer sentiment. Moreover, the severe fall-off in demand in the near term could cause some firms to cut prices. Households' inflation expectations have moderated slightly but the risk that expectations will become unanchored is low at this juncture. Among the non-core components of the CPI, residential property rents are expected to be broadly flat for the year as demand for accommodation eases in line with the reduced inflow of foreign workers. Car prices are likely to fall as households hold back on expenditure that requires large financial outlays. These factors will also keep CPI-All Items inflation low at between -1 and 0%.

The S\$NEER has acted as a buffer to the economy

Following the October 2019 Monetary Policy Statement, the trade-weighted nominal exchange rate hovered near the upper bound of the policy band. In January 2020, the outlook for the Singapore economy began to deteriorate after China placed Hubei province in a lockdown and cases of COVID-19 emerged in Singapore. On 5 February, MAS clarified that the monetary policy stance remained unchanged, but noted that there was sufficient room in the policy band to accommodate an easing of the S\$NEER in line with the worsening outlook for growth and inflation. The S\$NEER subsequently declined towards the mid-point of the policy band (**Chart 4.1**).

Chart 4.1 The S\$NEER fell from the top of the policy band to a level slightly below the mid-point over the last two months

S\$NEER, weekly average



Source: EPG, MAS estimates

Note: Vertical dashed lines indicate the last three releases of the Monetary Policy Statement.

MAS adopted a zero per cent rate of appreciation of the policy band starting at the prevailing level of the S\$NEER on 30 March

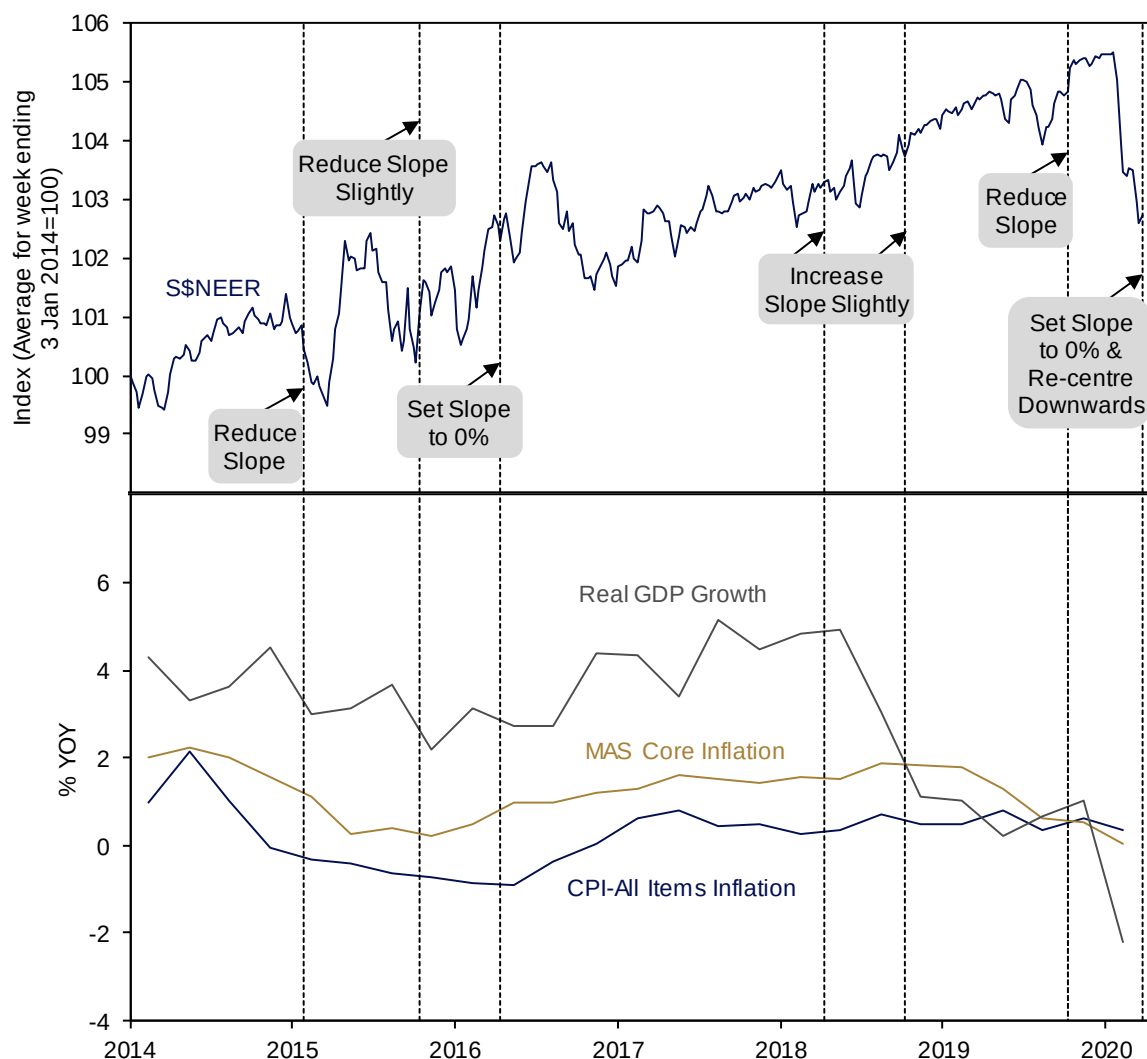
As the outlook for Singapore's growth and inflation deteriorated amid the escalating transmission of COVID-19 domestically and abroad, the S\$NEER eased further in an orderly manner over the following weeks. By end-March, the S\$NEER had fallen to a level slightly below the mid-point of the policy band.

In its Monetary Policy Statement on 30 March, MAS announced that it would adopt a zero per cent per annum rate of appreciation of the S\$NEER policy band starting at the then prevailing level of the S\$NEER. The width of the policy band was kept unchanged. This policy stance affirmed the level of the S\$NEER as well as the width of the policy band. The zero per cent appreciation of the band going forward would also impart a degree of stability to the trade-weighted exchange rate.

The S\$NEER had, in the lead up to the MAS policy review, already declined to a level that was congruent with the weaker growth and inflation outlook. This was facilitated by the flexibility afforded by MAS' monetary policy framework, notably the policy band. The band enabled the S\$NEER to adjust in a timely and orderly manner to the shock imparted by the COVID-19 outbreak. Given the magnitude of the shock in relation to Singapore's small open economy, MAS assessed that the equilibrium level of the real exchange rate had stepped down, and that the decline in the S\$NEER between late January and end-March was sufficient to achieve the necessary adjustment in relative prices. The re-centring to this prevailing level and concurrent flattening of the policy band was thus the appropriate response to the circumstances facing the economy going forward. Moreover, fiscal policy rather than monetary policy was envisaged to provide the primary offset to the fall in incomes through a shift to a strongly expansionary stance. **Chart 4.2** summarises the recent shifts in monetary policy, GDP growth and inflation in the Singapore economy.

Chart 4.2 Key macroeconomic variables and changes to the monetary policy stance

S\$NEER, Real GDP Growth, CPI-All Items inflation and MAS Core Inflation



Source: DOS and EPG, MAS estimates

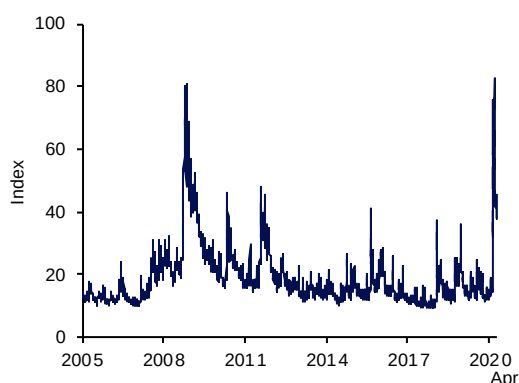
Note: Vertical dashed lines indicate changes to the settings of the S\$NEER policy band. For a summary of MAS past policy decisions, please see www.mas.gov.sg/monetary-policy/past-monetary-policy-decisions.

MAS sought to facilitate sufficient liquidity and credit flow in the domestic financial system against a tightening in global financial conditions

Global financial markets have tightened sharply in the last month, with a measure of risk aversion, the VIX, reaching an all-time high of 83 on 16 March (**Chart 4.3**). This occurred alongside sharp declines in the prices of risky assets. Equity indices in major advanced economies and the region fell by close to 20% compared to end-January (**Chart 4.4**), while spreads also widened in corporate and some sovereign debt markets.

Chart 4.3 The recent surge in VIX reached levels last seen during the GFC

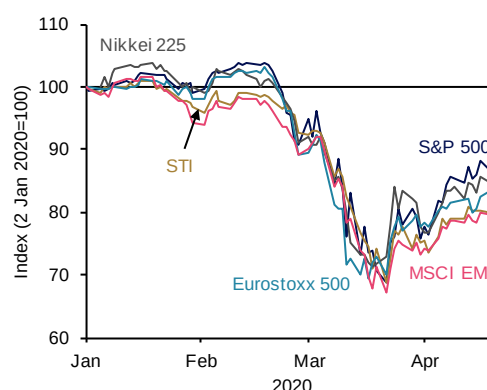
CBOE Volatility Index (VIX)



Source: Chicago Board Options Exchange (CBOE)

Chart 4.4 Equity prices plunged as COVID-19 spread across the world

Equity price indices



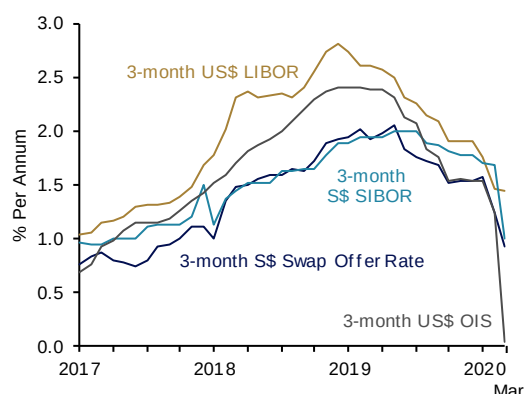
Source: Bloomberg

As indicated in the monetary policy statement, MAS' money market operations (MMO) will ensure that there is sufficient S\$ liquidity in the domestic financial system. Since the COVID-19 crisis began, MAS has left a higher level of S\$ liquidity in the banking system through its daily market operations. In conjunction with a stable path for the S\$NEER, S\$ interest rates are anticipated to remain low in line with US\$ interest rates (**Chart 4.5**). Notably, the US Federal Reserve reduced the Federal funds rate by 150 bps to 0–0.25% in two emergency meetings in the first half of March and committed to the purchase of an unlimited amount of Treasury and mortgage-backed securities. The cut in the Federal Reserve's key policy rate was reflected in the US\$ Overnight Index Swap (OIS) rate, although the US\$ LIBOR fell only modestly. The widening of the OIS-LIBOR spread reflected strains in international US\$ funding conditions. Taking Q1 as a whole, the 3-month S\$ SIBOR and Swap Offer Rate declined by 78 bps and 62 bps, respectively, more than the fall in the 3-month US\$ LIBOR.

Overall, domestic monetary conditions eased significantly in Q1 2020. As measured by the Domestic Liquidity Indicator, which captures movements in the S\$NEER and the 3-month S\$ SIBOR, S\$ liquidity conditions have become more accommodative, particularly in February and March (**Chart 4.6**). This was initially driven by the depreciation of the S\$NEER and, more recently, by the fall in the S\$ SIBOR.

Chart 4.5 Domestic interest rates have fallen in line with US\$ rates

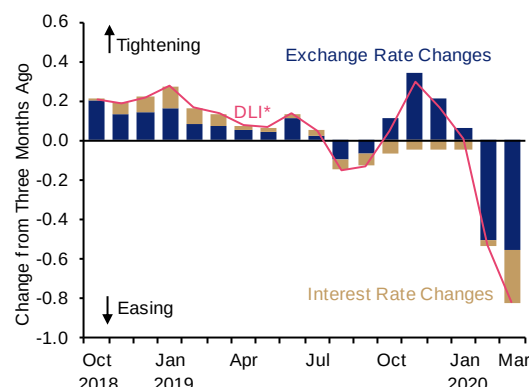
US\$ and S\$ interest rates, end of month



Source: ABS Benchmarks Administration Co Pte Ltd and ICE Benchmark Administration Ltd

Chart 4.6 The Domestic Liquidity Indicator points to a substantial easing in S\$ liquidity conditions

Domestic Liquidity Indicator (DLI) and components



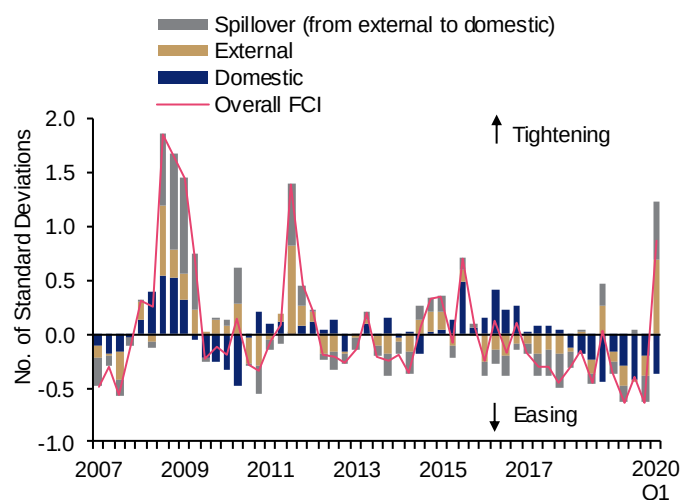
* EPG, MAS estimates

The Singapore economy has not experienced significant capital outflows or extraordinary US dollar funding stresses. Nonetheless, enabled by MAS' stock of official foreign reserves, MAS stepped up its provision of US dollar liquidity to the banking system. In particular, MAS increased the volume of foreign exchange swaps transacted at its daily MMO. MAS also established a new USD Facility to provide up to US\$60 billion of funding, drawing on the swap line between MAS and the US Federal Reserve. These actions will support more stable USD funding conditions in Singapore, and facilitate USD lending to businesses in Singapore and the region.

Looser domestic monetary conditions have partially offset the tightening in external financial conditions. Alongside heightened risk aversion globally, financial conditions in the Singapore economy have tightened. Indeed, MAS' Financial Conditions Index, a gauge of the difficulty of obtaining financing, rose to a level last seen in Q3 2011 during the Eurozone debt crisis (**Chart 4.7**). However, this tightening in Q1 2020 was predominantly driven by external factors, given Singapore's economic and financial openness.

Chart 4.7 Financial conditions in Singapore have tightened due to global factors

MAS' Financial Conditions Index (FCI), end of quarter



Source: EPG, MAS estimates

Note: The index covers a wide range of indicators across key financial and asset markets (foreign exchange, interest rate, equity, property and commodity markets), including global indicators. However, it excludes the S\$NEER as it is the intermediate target of monetary policy in Singapore.

MAS took regulatory steps and worked with financial institutions to ease credit conditions for businesses and households

The outbreak of COVID-19 has resulted in the drying up of income and revenue streams for some households and businesses. Consequently, many would require external financing to smooth consumption or meet their financial obligations. Local banks had reported a sharp rise in loan applications from small and micro enterprises, particularly in the retail trade, food services and hospitality sectors. There was thus a need to ensure that bank credit was widely available, and at a fair cost, to avoid unnecessary insolvencies and financial hardship to families. To this end, MAS introduced new facilities, took a number of regulatory steps, and worked with financial institutions to reduce the hurdles for firms and individuals to access credit.

First, MAS' liquidity measures have helped to ensure the effective functioning of the domestic financial system. Singapore's financial institutions are strong and by providing banks easy access to funds, they would be better able to intermediate credit to businesses and households and provide essential financial services.

Second, to further enhance banks' willingness and ability to lend, MAS also adjusted several regulatory requirements and supervisory programmes. For instance, banks would be allowed to recognise more of their regulatory loss allowance reserves as capital and take into account the government's fiscal assistance and other relief measures in setting accounting loan loss allowances. The implementation of the final set of Basel III reforms and other non-urgent industry projects have also been deferred so as to reduce banks' operational demands. These changes would allow banks and other financial institutions to divert their resources to meet the urgent needs of their customers.

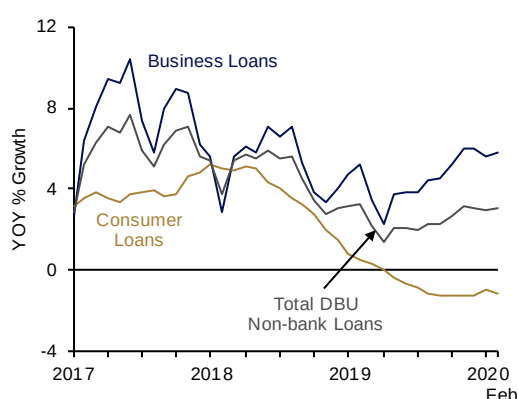
Third, MAS collaborated with the financial industry to roll out a package of targeted measures for individuals and businesses that have been adversely affected by COVID-19. With these specific schemes that individuals and SMEs can opt in to, borrowing constraints are expected to ease and credit will flow to where it is needed most. The measures for individuals would allow those that have been financially affected by the virus outbreak to defer payments on residential property loans, as well as on their life and health insurance premiums. Those who suffered a loss of 25% or more of their monthly income after 1 February would also be eligible to convert their outstanding credit card balances to lower-interest term loans. Similarly, SMEs would be allowed to defer principal repayment on secured loans and pay their general insurance premiums in instalments in order to improve their cash flows.

Fourth, in partnership with Enterprise Singapore (ESG), MAS launched a SGD facility to lend S\$ at an interest rate of 0.1% per annum for a two-year tenor to eligible financial institutions to support their lending to SMEs under the ESG Loan Schemes. The facility is expected to reduce financial institutions' cost of funds and complement the government's risk-sharing initiative in making loans to SME borrowers more affordable. This would further ease credit conditions for this group of firms. (For more information on the ESG Loan Schemes, see Section 4.2)

As a whole, this package of measures will help to ease financial conditions facing individuals and businesses and sustain the flow of credit to all sectors of the economy. The latest available data suggest that domestic borrowing conditions in the economy remained healthy as at February 2020. In February, total DBU non-bank loans grew by 3.1% y-o-y, similar to the average over the preceding three months (**Chart 4.8**). This was largely due to a rise in lending to businesses, particularly non-bank financial institutions (NBFIs) and firms in the general commerce and building & construction sectors (**Chart 4.9**). Meanwhile, there was no sign of a sharp contraction in lending to households.

Chart 4.8 Total DBU non-bank loans continued to expand steadily

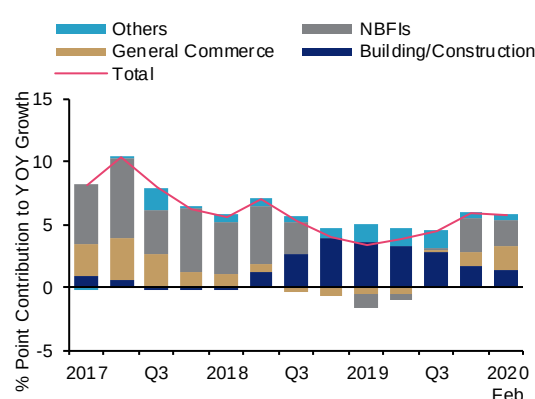
Outstanding stock of DBU non-bank loans



Source: MAS

Chart 4.9 Credit growth reflected the rise in lending to NBFIs and general commerce firms

Outstanding stock of DBU non-bank loans by sector



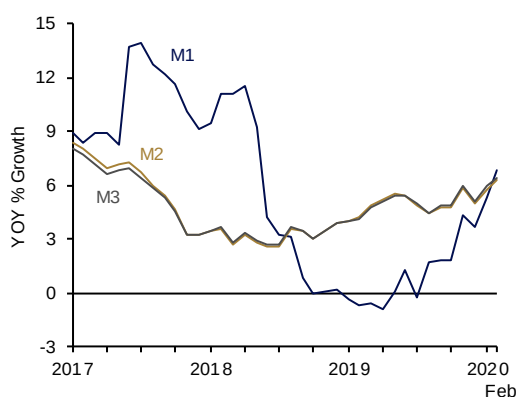
Source: MAS

Monetary aggregates have expanded in tandem with the growth in credit. On a year-ago basis, growth in M1 accelerated to 6.9% in February, from an average of 4.4% in the past three months, underpinned by an increase in the holdings of demand deposits and cash in active circulation (**Charts 4.10 and 4.11**). With fixed deposits and savings & other deposits also

rising during this period, broader monetary aggregates (M2 and M3) expanded by around 6.4% y-o-y.

Chart 4.10 The money supply has risen

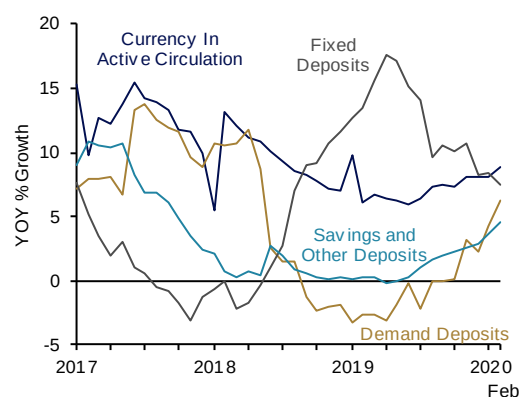
Monetary aggregates



Source: MAS

Chart 4.11 All components of the money supply increased in February 2020

Components of the money supply



Source: MAS

Given that domestic financial conditions tightened more substantially in March, the risk of a pullback in credit flows and monetary growth in the coming months is high. However, the monetary, liquidity, regulatory and financial policies announced by MAS in March and April should help to mitigate a further tightening. Monetary policy will complement the broader government initiatives to deal with the crisis, including fiscal policy, to ensure that the Singapore economy remains resilient through the crisis.

4.2 Fiscal Policy

Fiscal policy will be the most expansionary on record

In view of the unprecedented nature of the current crisis facing the Singapore economy, the government delivered three Budgets for FY2020—Unity, Resilience and Solidarity (and its extension)—within a nine-week period. The combined fiscal impulse from these Budgets, estimated at 8.6% of GDP for 2020, is the largest on record and reflects the likelihood that the economic contraction this year would be among the sharpest that Singapore has faced since Independence. The primary aim of most of the measures was to provide immediate financial relief to businesses and households and alleviate the economic cost of the outbreak and the public health measures taken in response. This substantial and timely counter-cyclical support is also expected to forestall a severe, but ultimately, temporary shock from inflicting lasting damage to the economy. Notably, the support has gone further than previous Budgets in providing direct transfers to self-employed persons and those unemployed due to COVID-19. To help finance these measures, the President has supported the government's request to draw up to \$21 billion from Past Reserves.

The main thrust was wage support to preserve firms' capabilities and jobs

The largest outlay in the 2020 Budgets was cash support for firms to retain their local employees. Under the enhanced Jobs Support Scheme (JSS), the government would co-fund 25% of the first \$4,600 of all resident employee gross monthly wages.¹ This would mean that for the median resident worker, the government would co-fund at least a quarter of their wages for nine months. Government support for locals working in the food services and travel-related industries would be even higher at 50% and 75% respectively, given the sharper drop in revenue expected in these sectors over the rest of the year. Specifically for April and May, during which the circuit breaker measures are in effect and all non-essential work activity has to cease, support would be raised to 75% for all firms.

The JSS is expected to reduce businesses' resident wage bills by almost 16.7% on average over this year (see Box B). During the period when the scheme is in effect, the average monthly reduction in the resident wage bill across all sectors would be 17.5%, with the subsidy doubling to 38.6% in April and May. The JSS is assessed to be particularly helpful for firms in the transportation & storage, wholesale & retail trade, and accommodation & food services sectors as these have a higher share of workers with incomes below the median. They will thus receive more support as a proportion of their wage bill. Overall, EPG has estimated that together with the tiered support system, these sectors, which have been most severely affected by the containment measures, would also receive the most financial support.

Firms would also receive Foreign Worker Levy (FWL) rebates of \$750 per employed work permit and S Pass holder each month during the circuit breaker period, in view of the work stoppages required. Foreign worker levies due in April and May would be waived. EPG's assessment is that the JSS and FWL measures will together deliver a substantial offset to firms' labour costs. While temporary, these cost savings will offer companies some reprieve, helping them to retain workers and resume operations after the circuit breaker restrictions are lifted. Simulation results using the Monetary Model of Singapore (MMS) suggest that local workers are the main beneficiaries and the measures will help some of them avoid outright

¹ The median gross wage of full-time employed residents in 2019 was \$4,600.

retrenchment this year. Notably, the resident unemployment rate would be about 0.7% point higher without the employment support measures.

Other measures in the Budgets to support businesses included a one-year postponement of all increases in government fees and charges, a three-month deferment of corporate income tax payments and a 25% corporate tax rebate for Year of Assessment 2020 (capped at \$15,000 for all tax-paying companies). Commercial properties that have been most affected by the virus outbreak, such as hotels, tourist attractions, shops and restaurants, would also receive a full property tax rebate for 2020, while other non-residential properties would be given a 30% rebate. The aim of these measures was to improve business operators' cash flows. To this end, the government has also introduced legislation to ensure that property owners pass on the property tax rebates in full to their tenants. In sectors where the government is the landlord, rents would be waived for up to three months.

There was special support for the hardest-hit sectors and SMEs

Apart from the enhanced JSS grant for the aviation industry, which alone would cost over \$400 million, the Budgets set aside a further \$462 million for an aviation support package. This was in recognition of the importance of maintaining a minimum level of air connectivity to the rest of the world so as to preserve supply chains, and would be used to fund measures such as rebates on landing and parking charges and rental relief for airlines, ground handlers, and cargo agents. As travel activity was likely to be muted for an extended period, a further \$90 million was set aside for the tourism industry to give all travel-related sectors a lift when the crisis ends.

While many of the cash support measures in the Budgets will be especially helpful to SMEs, some firms were likely to need additional support from banks. To ensure that SMEs in particular continued to have access to credit, the Budgets introduced a new Temporary Bridging Loan Programme (TBLP) and enhanced the Enterprise Financing Scheme (EFS)-SME Working Capital Loan. The TBLP would allow SMEs to borrow up to \$5 million, with the government bearing 90% of the risk of the loan, while those with further needs could tap on the SME Working Capital Loan to borrow an additional \$1 million. For SMEs in the trade-related sector, the maximum loan quantum under the EFS-Trade Loan scheme was also increased to \$10 million with the government's risk-share portion rising to 90%. Eligible businesses would also be able to defer principal repayments on EFS-Working Capital loans and TBLP loans for a year, subject to assessment by participating financial institutions.

The Budgets encouraged firms and workers to invest for the future

The Budgets concurrently sought to help businesses and workers make the best use of their temporary spare capacity and prepare for the eventual recovery. For businesses, the SME Go Digital Programme, the Productivity Solutions Grant and the Enterprise Development Grant were enhanced to encourage them to restructure, digitalise and upgrade during the downtime. For workers, course fee subsidies and absentee payroll were raised to 90% for those in the aviation, tourism, food services, retail, arts & culture and land transport sectors. The 90% absentee payroll rate was also extended to employers from all sectors who sent their employees for training.

At the same time, social distancing requirements have provided fresh impetus for businesses to embrace new technology, online platforms and telecommuting. Besides enabling firms to remain in operation during this period, these shifts would also accelerate Singapore's digitalisation drive. To this end, Budget measures were introduced to support the

transition and entrench longer-term benefits. For instance, ESG is subsidising food and beverage outlets that are making the move to online delivery platforms. In addition, \$55 million was earmarked for the arts and culture sector, not only to support organisations and practitioners through the crisis, but to encourage cultural activity through digital formats.

In confronting the COVID-19 crisis, the government also temporarily amended regulations to encourage better worker mobility and matching. For instance, amid the shift towards telecommuting, demand for domestic land transportation has declined, while there has been a significant increase in the demand for delivery services. The Ministry of Transport has therefore allowed taxi and private hire car (PHC) drivers to provide delivery services in the interim. The Ministry of Manpower has also temporarily loosened regulations to allow existing foreign workers in Singapore to move across firms, thus filling shortages even as spare capacity mounts in other sectors.

There were new measures to help the self-employed

The government recognised that there was a large group of self-employed individuals who would not benefit from the JSS and other firm-related measures. The Resilience Budget therefore introduced the Self-Employed Person Income Relief Scheme (SIRS), which would provide eligible self-employed persons with lesser means and family support with \$1,000 in direct cash assistance per month for nine months. SIRS is expected to benefit an estimated 100,000 individuals.

The training allowance under the Self-Employed Person Training Support Scheme was also enhanced to encourage the self-employed to train and upskill during their downtime. In addition, eligible taxi and PHC drivers would receive Special Relief Fund payments of \$300 per vehicle per month until end-September. Taxi and PHC operators also provided additional relief for their drivers. Overall, the Unity and Resilience Budgets earmarked \$140 million for the Point-to-Point Support package for drivers as well as taxi and PHC operators.

Households received significant transfers, with more for the lower-income

While keeping workers in their jobs and helping jobseekers find new roles are the main ways in which the government has sought to help workers, the Resilience Budget also acknowledged that some would inevitably be laid off. Other workers could face financial difficulties due to shorter work weeks, no-pay leave, and reduced pay (See Chapter 3.1). The Budget therefore introduced the Temporary Relief Fund to provide urgent financial assistance to workers who had lost their jobs or experienced a significant loss in income due to COVID-19. The Temporary Relief Fund allowed such workers to draw on \$500 in cash in April 2020.

In addition, the COVID-19 Support Grant was introduced to provide low- to middle-income workers who had been laid off due to the outbreak with \$800 a month for three months. The temporary assistance recognised that these workers had fewer financial buffers and could therefore experience hardship during their job search process. The Resilience Budget also announced that the government would exercise more flexibility when considering applications for existing ComCare schemes during this period.

The assistance provided by these relief schemes are in addition to cash payouts for all adult Singaporeans ranging from \$600 to \$1,200, with the lower income receiving more and an extra \$300 for those with young children. Needy Singaporeans would also receive \$400 worth of grocery vouchers over 2020–21. Moreover, Singaporeans who received Workfare Income Supplement payouts in 2019 would be given a Workfare Special Payment of \$3,000

in cash. In the absence of these policies, it is likely that vulnerable and liquidity-constrained individuals would encounter difficulties in maintaining their normal level of consumption. As all transfers have been skewed towards lower and middle-income households with higher propensities to consume, their impact in terms of supporting consumption is expected to be larger than if the population had been targeted more uniformly.

Simulation results from the MMS confirm the presence of consumption smoothing effects arising from the Budget measures, even as opportunities to spend are constrained by the movement restrictions implemented as part of the circuit breaker measures. On average, personal disposable incomes will be augmented by 2.8% in 2020 as a result of the transfers. In turn, private consumption will be 1.6% higher, although this will dissipate in 2021.

Table 4.1 below summarises the key measures across the Unity, Resilience and Solidarity Budgets.

Table 4.1 Summary of key measures from Unity, Resilience and Solidarity Budgets

KEY BUDGET INITIATIVES IN FY2020

A. FOR BUSINESSES

Cash Flow, Costs and Credit Measures

A1. Jobs Support Scheme (JSS)

- Government to co-fund 25% of the first \$4,600 of gross monthly wages of every local employee (including those who are also shareholders and directors of the company, and have Assessable Income of \$100,000 or less for Year of Assessment 2019) for nine months.
- Firms in aviation, tourism (75%) and food services (50%) to get more support.
- Co-funding increased to 75% for all firms during circuit breaker period.

A2. Enhancements to Wage Credit Scheme

- Raise monthly wage ceiling to \$5,000 for qualifying wage increases in 2019 and 2020.
- Increase government co-funding levels in 2019 and 2020 by 5% points to 20% and 15%, respectively.

A3. Foreign Worker Levy Offsets

- Waive monthly Foreign Worker Levies due in April and May 2020.
- Firms to receive monthly rebate of \$750 per work permit or S Pass holder during circuit breaker period, based on levies paid in 2020.

A4. Property Tax Rebate

- 100% of tax payable in 2020 for qualifying commercial properties e.g., hotels, serviced apartments, tourist attractions, shops and restaurants.
- 60% for Integrated Resorts (Marina Bay Sands and Resorts World Sentosa).
- 30% for other non-residential properties.

A5. Rental Waivers

- Waive three months of rental for stallholders at NEA hawker centres, and up to two months for other commercial and non-residential premises managed by government agencies.

A6. Reducing Tax Burden for Corporates

- 25% rebate on income tax payable for Year of Assessment 2020, capped at \$15,000.
- One-year enhancement of certain tax treatments e.g. faster write-down of investments in plants and machinery.
- Automatic three-month deferment of income tax payments due in April, May and June 2020.

A7. One-year Enhancement of Enterprise Financing Scheme

- Raise maximum loan quantum for SME Working Capital Loan to \$1 million, from \$300,000 and Trade Loan to \$10 million, from \$5 million.
- Increase Government's risk share to 90% for loans initiated from 8 April 2020 to 31 March 2021.
- SMEs may request to defer repayment of principal for one year.

A8. Enhanced Loan Insurance Scheme

- Increase subsidies for loan insurance premiums from 50% to 80% for one year to help SMEs with trade financing costs.

A9. New Temporary Bridging Loan Programme

- Participating financial institutions to offer loans of up to \$5 million, with interest rate capped at 5% per annum and maximum repayment period of 5 years.
- Government will bear 90% of the risk for loans taken out from 8 April 2020 to 31 March 2021.
- Enterprises may request to defer repayment of principal for one year.

*Additional Assistance for Sectors Hit Hardest by the COVID-19 Pandemic***A10. Enhanced Aviation Support Package**

- Cost relief for airlines, ground handlers and cargo agents (e.g., rental and landing charge rebate).
- Provide funding to maintain minimum level of air connectivity for the return of overseas Singaporeans and transportation of goods.
- CAAS will allow Singapore carriers and the airport operator to defer partial or full payment of certain fees due between 1 April 2020 and 31 March 2021 by up to one year.

A11. Additional Support for Tourism Sector

- Increase maximum funding level for qualifying costs by 10% points for tourism grants such as Business Improvement Fund, Kickstart Fund and Leisure Events Fund.
- \$90 million set aside to support recovery of tourism sector.

A12. Point-to-Point Support Package

- Special Relief Fund payments of \$300 for taxi main hirers and eligible Private Hire Car (PHC) drivers until end-September 2020.
- Licence fee waivers for peer-to-peer operator for nine months.
- Help for taxi operators to defray costs of growing un-hired fleet.
- One-time waiver of \$100 PHC vehicle outward conversion fee from May to September 2020.

A13. Assistance for Private Bus Owners

- One-year road tax rebate for all private buses.
- Six-month waiver for Class 2 Bus Service Licence fees and season parking fees.

A14. Arts and Culture Resilience Package

- One-time Capability Development Scheme for the Arts (CDSA) grant for eligible arts organisations and individuals to encourage upskilling and grow organisational capabilities.
- New Digitalisation Fund to support the digitalisation of local arts and culture content, and create new experiences for audiences.

*Investing for the Future***A15. Expansion of SMEs Go Digital Programme**

- Introduce Industry Digital Plans or equivalents for all 23 ITM sectors.
- Support for wider range of pre-approved digital solutions, including online collaboration tools in 2020.
- 80% funding support for advanced digital solutions (e.g. mobile robots, digital concierges) for May to December 2020.

A16. Enhancement of Enterprise Development Grant (EDG) and Productivity Solutions Grant (PSG)

- Raise maximum support level from 70% to 80% for April to December 2020.

- Support of up to 90% under EDG for firms severely affected by COVID-19, on a case-by-case basis.
- Extend scope of PSG to job redesigning consultancy services.

A17. Launch of GoBusiness Platform

- Streamlines business transactions with the government.

A18. Enterprise Leadership for Transformation Programme

- To provide training and mentorship for business leaders of 900 enterprises in business transformation.

A19. New SkillsFuture Enterprise Credit

- One-off \$10,000 SkillsFuture Enterprise Credit for eligible enterprises to defray 90% of out-of-pocket expenses for enterprise and workforce transformation programmes.

A20. Enhanced Training Support

- Subsidise 90% of course fees for employers in aviation, tourism, food services, retail, art & culture and land transport sectors who send their workers for eligible sector-specific training that starts this year.
- Extend 90% absentee payroll rates to all employers from 1 May 2020, capped at \$10 per hour per trainee.

B. FOR INDIVIDUALS AND HOUSEHOLDS

Income and Job Support

B1. Self-employed Person (SEP) Income Relief Scheme

- Cash payouts of \$3,000 in May, July and October 2020 for each eligible SEP.

B2. Reducing Tax Burden for SEPs

- Automatic three-month deferment of income tax payments due in May, June and July 2020.

B3. Workfare Special Payment

- \$3,000 payout for all Singaporean workers aged 35 and above in 2019 who received Workfare Income Supplement payments for Work Year 2019.

B4. Greater flexibility for ComCare applications

- To ensure more Singaporeans who fall into financial hardship during this period can get help.

B5. Temporary Relief Fund (only for the month of April 2020)

- Immediate, one-off financial assistance of \$500 for eligible Singaporeans and Permanent Residents who lose their jobs or at least 30% of their income due to COVID-19.

B6. COVID-19 Support Grant (applications from May–Sep 2020)

- Cash grants of \$800 a month for three months for lower- to middle-income Singaporeans and Permanent Residents who have lost their jobs due to the outbreak and continued to face challenges securing employment.
- Recipients must commit to actively participate in job search, or attend a training programme under Workforce Singapore or the Employment and Employability Institute (e2i).

B7. SGUnited Traineeships Programme and Jobs Initiative

- Government will co-fund wage costs of companies offering traineeships to first-time jobseekers.
- Government to work with partners to create approximately 10,000 jobs over the next year in both the public and private sectors.

Upskilling and Reskilling

B8. SEP Training Support Scheme

- Training allowance of \$10 per hour for SEPs attending eligible courses from 1 May 2020.

B9. Top-up of SkillsFuture Credit

- A one-off \$500 top-up for every Singaporean aged 25 years and above in 2020, for use between 1 October 2020 and 31 December 2025. Advance use of the credit will be available from 1 April 2020 at Institutes of Higher Learning and the NTUC Learning Hub.

B10. SkillsFuture Mid-Career Support Package

- To help locals in their 40s and 50s stay employable and move on to new jobs and roles.
- Increase capacity of existing reskilling programmes, e.g. Professional Conversion Programmes.
- 20% salary support for employers who hire local jobseekers aged 40 and above through a reskilling programme for six months, capped at \$6,000 in total.

- Special SkillsFuture Credit top-up of \$500 for every Singaporean aged 40 to 60, for use between 1 October 2020 and 31 December 2025.
- Volunteer Career Advisors from professional communities to provide peer support and career guidance.

B11. Senior Worker Support Package

- Senior Employment Credit to replace Special Employment Credit and Additional Special Employment Credit with effect from 2021.
- CPF Transition Offset in 2021 to help businesses adjust to higher employer CPF contribution rates.
- Senior Worker Early Adopter Grant for enterprises that raise their own retirement and re-employment ages ahead of legislated changes.
- Part-Time Re-employment Grant for firms that voluntarily commit to providing part-time re-employment.

*Households, families and communities***B12. Care and Support Package**

- One-off cash payment of \$300–\$900 for all adult Singaporeans, depending on income.
- Additional \$300 for adult Singaporean parents with children aged 20 and below.
- \$100 PASSion Card top-up to be disbursed in cash for Singaporeans aged 50 and above.
- \$300 worth of Grocery Vouchers in 2020 and \$100 in 2021 for needy Singaporeans.
- Doubling of regular GST Voucher (GSTV) – U-Save in FY2020 through a one-off GSTV – U-Save Special Payment for eligible HDB households.
- Eligible larger households with five or more members to get additional 50% GSTV – U-Save rebate, totalling 2.5 times the regular quantum.
- Extend Service and Conservancy Charges rebates for HDB households for another year.
- \$20 million additional grant over two years to Self-Help Groups and \$75 million additional grant to Community Development Councils in FY 2020 to scale up local assistance schemes to support vulnerable households.

B13. Solidarity Payment

- \$600 cash payment for all adult Singaporeans, comprising \$300 brought forward from the cash component of the Care and Support Package and an additional \$300 cash payment.
- \$300 for Long-term Visit Pass-Plus holders who are spouses of Singaporeans.
- Adult Permanent Residents with Singaporean parents, spouses or children may apply for a \$300 payout.

B14. Greater Flexibility on Government Fees and Loans

- No increase in government fees and charges for a year.
- Suspend loan repayment and interest charges for government student loans for a year.
- Suspend late payment charges on HDB mortgage arrears for three months.

B15. Assurance Package for GST

- \$700–\$1,600 cash payout for every adult Singaporean over five years to cushion the impact of GST hike when implemented.
- Enhance permanent GSTV Scheme for lower- to middle-income households.
- \$6 million set aside for GSTV Fund from FY2020 Budget.

B16. Enhancement of Support for Education

- Enhance MOE Financial Assistance Scheme, with annual bursary quantum for pre-university students raised to \$1,000, increased transport subsidies for all students and increased school meals subsidies for secondary school students.
- Cash bursary for lower- and middle-income ITE students to increase by up to \$200 a year. Students from families in the lowest income tier will also get 100% fee subsidies on top of the cash bursary.

B17. Matched Retirement Savings Scheme

- From 2021 to 2025, Government to match every dollar of cash top-up made to CPF Special or Retirement Accounts of eligible Singaporeans aged 55 to 70 who have not been able to set aside the prevailing Basic Retirement Sum, capped at \$600 per year.

B18. Expansion of Silver Support Scheme

- Raise quarterly cash payouts by 20%.

- Higher threshold for lifetime wages and per capita household income, so more seniors are eligible.
- New payment tier for seniors with monthly household income above \$1,300 but not more than \$1,800.

B19. Enhancement of Housing Monetisation Schemes

- Increase maximum cash bonus for the Silver Housing Bonus and Lease Buyback Scheme from \$20,000 to \$30,000.
- Simplify the Silver Housing Bonus scheme.

B20. Enabling Employment Credit

- Provides wage offsets to employers of persons with disabilities. Replaces Special Employment Credit and Additional Special Employment Credit Schemes for employment of persons with disabilities.

B21. Establishment and Top-up of Funds

- New Community Capability Trust to fundraise and support social service sector partners in capability- and capacity-building (\$150 million).
- Establish Partnership Development Fund (\$150 million).
- Our Singapore Fund (\$20 million).
- ElderCare Fund (\$750 million).
- ComCare Fund (\$500 million).
- MediFund (\$200 million).

C. ENVIRONMENTAL SUSTAINABILITY

C1. New Commercial Vehicle Emissions Scheme

- Light goods vehicles, goods-cum-passenger vehicles and small buses will be grouped into three pollution standard bands.
- Buyers of Band A (i.e., cleanest tier) vehicles to get \$30,000 incentive over three years and Band B \$10,000 rebate upfront. Buyers of Band C vehicles will have to pay surcharge of \$10,000 upon registration.

C2. Electric Vehicles Early Adoption Incentive

- Up to 45% rebate on Additional Registration Fee for fully electric cars and taxis, capped at \$20,000.

C3. Establishment of Coastal and Flood Protection Fund

- To protect against rising sea levels (\$5 billion).

Source: MOF

The overall budget deficit will widen substantially in FY2020

The overall budget deficit (excluding the extension to Solidarity Budget measures announced on 21 April) is projected to rise to a record \$44.3 billion or 8.9% of GDP for FY2020, from \$1.7 billion or 0.3% of GDP in FY2019 (**Table 4.2**).

The primary deficit is expected to see an almost six-fold increase in FY2020, to \$19.4 billion, as total operating revenue falls alongside weaker economic growth while total expenditure increases. Special transfers, including top-ups to endowment and trust funds, will rise to \$43.6 billion in FY2020, largely on account of the support extended to individuals and businesses to tide them through the current downturn.

Table 4.2 Budget summary

	FY2019 Revised		FY2020 Revised	
	\$ Billion	% of GDP	\$ Billion	% of GDP
Operating Revenue	74.7	14.7	70.4	14.1
Total Expenditure	78.2	15.4	89.8	18.0
Primary Surplus (+) / Deficit (-)	-3.4	-0.7	-19.4	-3.9
Less: Special Transfers (excluding top-ups to endowment/trust funds)	1.7	0.3	26.3	5.3
Basic Surplus (+) / Deficit (-)	-5.1	-1.0	-45.6	-9.2
Less: Special Transfers (top-ups to endowment/trust funds)	13.6	2.7	17.3	3.5
Add: Net Investment Returns Contribution	17.0	3.3	18.6	3.7
Budget Surplus (+) / Deficit (-)	-1.7	-0.3	-44.3	-8.9

Source: MOF

Note: The FY2020 estimates were revised following the Resilience and Solidarity Budgets. They currently do not take into account the extension to the Solidarity Budget announced on 21 April 2020, which will cost the government another \$3.8 billion.

The current circumstances warrant a draw on Past Reserves

Singapore's reserves have been accumulated to serve as a bulwark against a shock and crisis of this magnitude. It provides the government with the fiscal wherewithal to provide relief for households and firms in a timely manner, without being encumbered by concerns over debt sustainability.

In order to fund parts of the Resilience and Solidarity Budgets, the government has obtained the President's approval to draw up to \$21 billion in Past Reserves. This reflects the exceptional nature of the pandemic. Unlike previous downturns in Singapore, which typically stemmed from a fall in external demand, the current pandemic has called for a temporary shutdown of large parts of the domestic economy in order to slow the spread of the virus. The economy will thus also be impacted by negative shocks to aggregate supply and domestic demand. Temporary closures of many workplaces will reduce the supply of domestic-oriented services, while strict social distancing measures will curtail spending by domestic consumers, affecting aggregate demand. Under these circumstances, fiscal support needs to step in to ensure that temporary liquidity strains arising from the circuit breaker measures do not lead to premature bankruptcies and a permanent impairment of the economy's productive capabilities.

In particular, not intervening aggressively at this stage may require even more costly fiscal intervention in the future. For instance, unemployment could rise rapidly but then take an extended period to fall because of the search and matching process needed to connect people to jobs. Similarly, firm bankruptcies and job-worker separations may result in a loss of intangible capital, such as firm-specific management capital, networks and workers' skills.

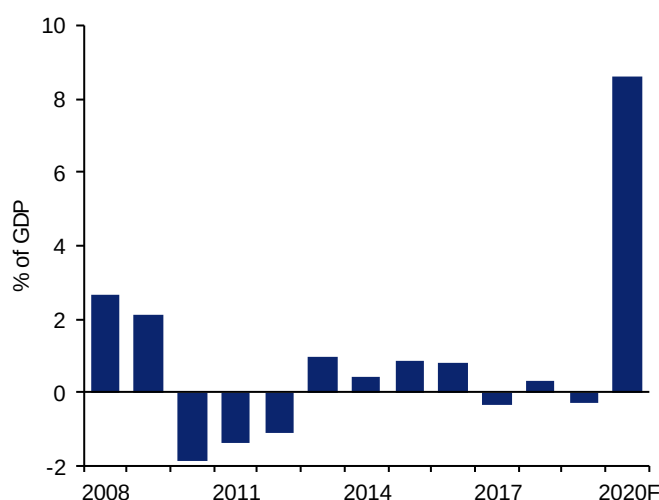
The fiscal policy stance has turned highly expansionary

The fiscal impulse is estimated to be large at 8.6% of GDP in CY2020, which embodies the strong counter-cyclical support to the economy that is necessary, given the unprecedented crisis that Singapore is confronting (**Chart 4.12**). This policy support represents the government's concerted effort to provide relief for, and mitigate the hardships of, firms and households. When heightened social distancing measures are gradually lifted, it should also help to sustain ongoing baseline levels of activity, spending and incomes in the economy.

The macroeconomic impact of the Budgets depends not only on the size of the fiscal injections but also their respective fiscal multipliers.² The COVID-19-related measures in the Unity Budget comprised a significant proportion of cost-saving initiatives, such as the Wage Credit Scheme, whereby the funds will only be disbursed to firms in the second half of 2020. In comparison, the Resilience and Solidarity Budgets were designed with a greater emphasis on a timely response through direct cash transfers given the rapid escalation of the disease. A significant portion of the fiscal outlays in the latter two Budgets will therefore take place in Q2 2020. As a result, the first-year multiplier for the COVID-19-related measures in the Unity Budget is estimated to be the relatively smaller among the three Budgets, while those for the Resilience and Solidarity Budgets (including the extension) were larger.

Chart 4.12 The fiscal impulse will rise to around 8.6% of GDP in CY2020

Fiscal Impulse



Source: EPG, MAS estimates

Singapore's macroeconomic policy responses have been complementary, timely and decisive

The hit to the economy from COVID-19 will be significant as the government implements the necessary measures to contain the pandemic. The aim of the government's wide-ranging

² The multipliers measure the increase in real GDP for every dollar of fiscal injection and are thus affected by implementation lags and, more importantly, the composition of the COVID-19-related measures in each Budget. Broadly speaking, a given amount of cash transfers will have a larger first-year impact multiplier than the same amount of cost-saving measures, as cash transfers induce consumption spending while cost savings take time to work through the economy.

macro-policy responses is to help households, vulnerable individuals and businesses tide over a period of sharply lower cashflow. Notably, EPG's quantitative general equilibrium analysis finds that the financial and macroeconomic policy measures undertaken in Singapore will help dampen amplification mechanisms and partially "short-circuit" negative feedback effects. Fiscal policy, in conjunction with monetary, liquidity and regulatory policies, would therefore materially reduce the depth of the economic recession. The measures taken will help save jobs, protect livelihoods and better enable businesses to preserve their capacity and capabilities. At the macroeconomic level, the intention is to adopt a policy mix appropriately calibrated to addressing the unprecedented nature of this crisis. In the face of a significant negative output gap³, the exchange rate has been set at an appropriate level to prevent a broadening of disinflationary pressures. Liquidity and regulatory policies will ensure that credit flows to all parts of the economy. Fiscal policy will provide the main contribution to the expansionary macro-policy stance this year while delivering significant short-term relief to households and firms.

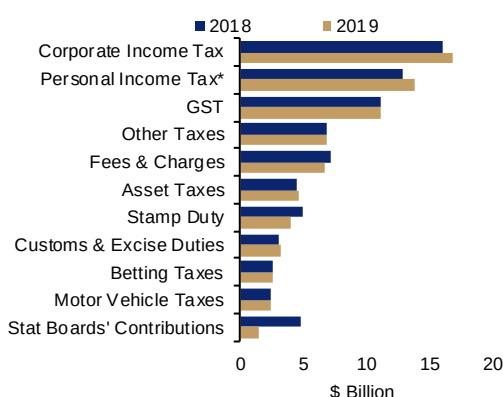
Government operating revenues declined in CY2019 compared to the previous year

In CY2019, total operating revenues fell by \$1.8 billion to \$75.3 billion (14.8% of GDP). This primarily reflected lower Statutory Boards' Contributions, after an exceptional payment from MAS in CY2018 (**Chart 4.13**). Revenues from stamp duty and fees & charges also saw a step-down during the year, alongside a decline in property transactions and weighted COE premiums, respectively. In comparison, corporate and personal income tax collections increased to \$30.9 billion, from \$29 billion previously, amid positive GDP growth and wage gains last year.

³ The output gap is a measure of the difference between GDP and its estimated potential. Under the current unprecedented circumstances, there is a high degree of uncertainty about how negative it will turn out to be. First, the lack of clarity over the duration of the COVID-19 outbreak and hence, the containment measures taken in response, increases the uncertainty of GDP projections. Second, there are conceptual and empirical difficulties with measuring trend output because of the impact of the circuit breaker measures on short-term productivity and labour supply. Specifically, the restriction on movement could cause a temporary reduction in both productivity and effective labour supply, but the impact of this is unknown. Accordingly, policymaking will place a greater weight on a range of direct indicators, including inflation and unemployment.

Chart 4.13 Operating revenue was lower in 2019 as Statutory Boards' Contributions fell

Operating revenue by source

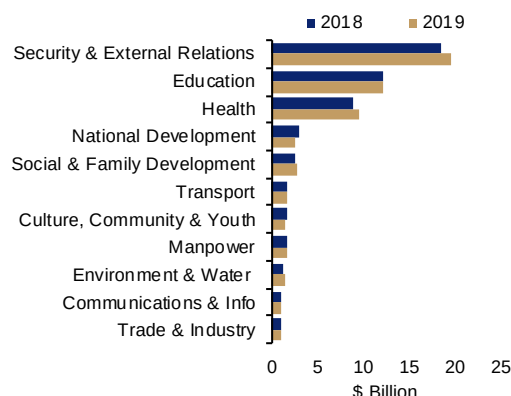


Source: MOF

* Includes withholding tax

Chart 4.14 Operating expenditure rose in 2019, partly reflecting higher healthcare expenses

Operating expenditure by sector



Source: MOF

The increase in operating expenditure outweighed the fall in development expenditure

Total government expenditure rose by \$0.8 billion to \$76 billion (15% of GDP) in 2019, with the increase in operating expenditure exceeding the decline in development expenditure.

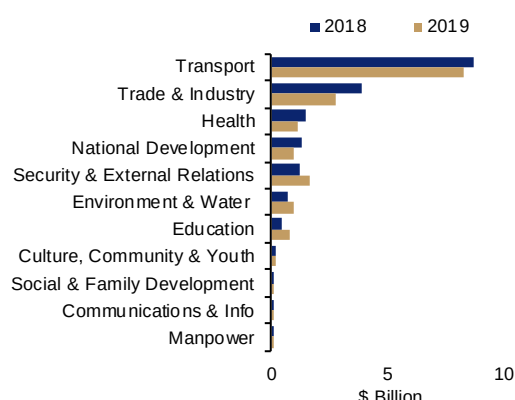
Operating expenditure, which includes expenses on manpower, operating grants and subventions to statutory boards and other organisations, amounted to \$58 billion (11.4% of GDP) in 2019, \$1.7 billion higher than a year ago. Notably, the Ministry of Health had channelled more funds to public healthcare institutions, Voluntary Welfare Organisations, and private sector partners, such as general practitioners and dental clinics, during the year to ensure that the needs of an ageing population are met (**Chart 4.14**).

Development expenditure, which comprises longer-term investment in capitalisable assets such as buildings and roads, fell by \$0.9 billion to \$18.1 billion (3.6% of GDP) in 2019. Outlays by the Ministry of Trade and Industry declined during the year due to lower requirements from EDB to implement its 'Attract, Transform and Create' strategy (**Chart 4.15**).⁴ At the same time, the Ministry of National Development spent less, in line with the progress made on public housing upgrading programmes and enhancements to parks. Delays in cross-border rail projects also led to a fall in the Ministry of Transport's expenditure.

⁴ EDB's 'Attract, Transform and Create' strategy is part of a broader industry restructuring initiative and innovation drive to secure longer-term competitiveness and future economic growth.

Chart 4.15 Development expenditures declined in several ministries

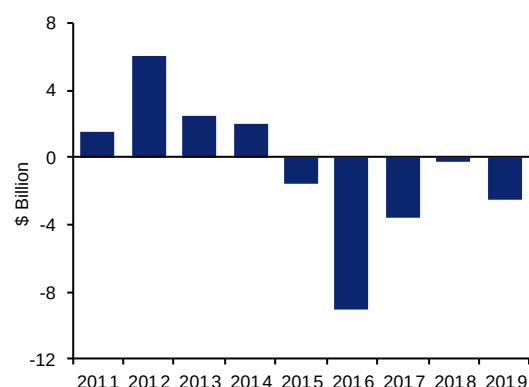
Development expenditure by sector



Source: MOF

Chart 4.16 The government recorded a larger basic deficit in CY2019

Government basic deficit



Source: MOF

The government's basic deficit widened

The decrease in operating revenue and increase in total expenditure led to a primary deficit of \$0.7 billion (0.1% of GDP) in 2019, a reversal from the \$1.9 surplus seen in the preceding year. Special transfers, excluding top-ups to endowment and trust funds, fell from \$2.2 billion to \$1.7 billion in 2019. Apart from a one-off SG Bonus that bolstered transfers in 2018, the decline also reflected the expiration of the Temporary Employment Credit and Productivity Innovation Credit schemes. Separately, lower payments were made to workers under the Wage Credit Scheme in 2019.

On the whole, the government's basic balance, which is the primary balance less special transfers (excluding top-ups to endowment and trust funds), went into a larger deficit of \$2.5 billion in 2019, from \$0.3 billion the year before (**Chart 4.16**).

Special Feature A

Asia's Electronics Supply Chains and Global Trade Corridors

1 Introduction

Over the past half century, Asia has grown into a global manufacturing powerhouse alongside the export-oriented industrialisation process adopted by many countries. The region's dominance in manufacturing activity is most evident in the electronics industry, where it currently accounts for two-thirds of global production. The conjunction of a liberal global trade system and the cross-border deployment of production nodes by comparative advantage across the electronics value-added chain have given rise to the proliferation of electronics supply chains in the region. At the same time, China has expanded and upgraded its manufacturing capabilities rapidly since the 2000s and now lies at the centre of production chains. However, the country's rising labour costs over the past decade have induced significant and ongoing shifts in these chains. Since 2018, this reconfiguration process has been accelerated by heightened trade tensions between the US and China, resulting in the imposition of additional tariffs on Chinese exports. Given the strong inter-connectedness of electronics production in Asia, the trade frictions have implications for China, as well as for the region as a whole.

This Special Feature aims to assess the impact of the US-China trade conflict on regional as well as global patterns of electronics trade, focusing particularly on the US' demand for electronics goods produced by Asia's China-centric production network. It is divided into two main parts: in the first, the electronics trade corridors prior to the onset of the US-China tensions are described. The global and regional trade flows in intermediate and final electronics goods as well as supporting services are presented, alongside the rise of Vietnam as a key node. The second part assesses how electronics supply chains have shifted since the implementation of the additional US tariffs on China's products. The impact of the tariffs on countries' market shares in electronics imports to the US is considered, as well as their indirect effects on the suppliers of electronics inputs. Finally, the driving factors underpinning future trends in the electronics supply chains in Asia and US-Mexico are briefly discussed.

2 Pre-tariff Electronics Trade Corridors

To characterise the regional electronics supply chain and its impact on trade flows, the framework shown in **Figure 1** is used. The final demand for electronics goods in a given economy can be fulfilled by domestic producers or via imports, i.e., foreign suppliers. In turn, these producers will require intermediate inputs, which can similarly be purchased from domestic suppliers or foreign firms. The supply chain in turn gives rise to trade flows along well-established global and regional corridors, as described below. Based on this framework, the electronics linkages and corresponding trade flows across Asia are analysed using trade

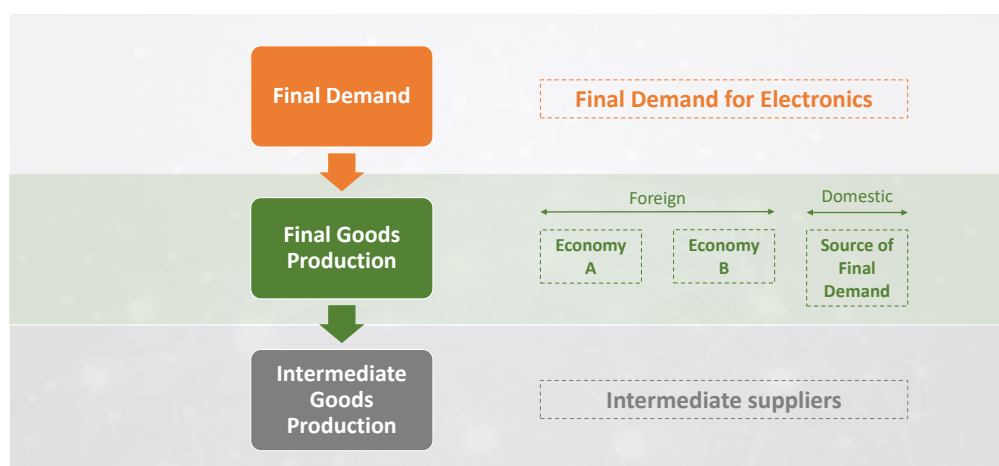
data extracted mainly from the UN Comtrade database down to the 4-digit level over the period 2007–2017.¹

US and China Final Demand

In terms of final demand, China is the largest market for electronics products, with a global share of 20% in 2015, followed by the US, with a share of 17%. Nevertheless, reflecting China's larger role as a global manufacturer of such products, only one-third of its demand for final electronics goods is satisfied by imports, compared with more than two-fifths for the US. Indeed China is the top exporter of electronics products, including personal computers (PCs), mobile phones, hard disk drives (HDD) and parts for PCs, accounting for at least half of global exports (excluding re-exports) for the first two categories. As such, China is an important import source of both final electronics products and intermediate components for the Asian countries and the US. In the case of the European Union (EU), China is a major supplier of mainly final products.

Of its total imports of final electronics goods, the US sources about 60% from China and another one-fifth from Mexico. Supplies from China are mainly mobile phones and PCs while imports from Mexico comprise computer central processing units (CPU) and TVs, in addition to mobile phones. Notably, China accounts for almost all of the US' PC imports. As for China, reflecting its domestic production capabilities in a range of a final electronics goods, its imports are mainly peripherals including HDDs from Thailand, the Philippines, South Korea and Taiwan, as well as audio/visual-related products from Vietnam, South Korea, Japan and the EU.

Figure 1 Electronics supply chains



Intermediate Goods Trade Flows

Integrated circuits (ICs) are the building blocks of electronics products. With electronics production concentrated in Asia, there has been a sharp pickup in IC trade within the region in the last decade. In particular, China is one of the largest global suppliers of ICs with its share almost doubling to about 18% in the span of a decade. At the same time, China is also the largest market for ICs globally, with its imports almost three times its exports. It exports

¹ The UN Comtrade data is supplemented with a more detailed breakdown of Singapore's trade flows provided by Enterprise Singapore. Some data series are available only up to 2016, including Hong Kong SAR's re-exports.

ICs to Taiwan and South Korea, but also purchases eight times and five times more ICs from them respectively.

Taiwan is the largest global exporter of ICs with a slightly higher share than China's, and is the main supplier to China, Japan, Malaysia and Thailand as well as a major source for the Philippines and South Korea. South Korea ranks on par with China in terms of IC exports and is the largest source for Vietnam and the Philippines. The two firms dominating world high-end IC design and manufacturing are Taiwan Semiconductor and the South Korean firm, Samsung. As a result, the shares of Taiwan and South Korea in China's overall intermediate electronics imports are considerable at 25% and 22% respectively (**Figure 2 and Table 1**).

Figure 2 China's sources of intermediate electronics inputs (2017)



Figure 3 Mexico's sources of intermediate electronics inputs (2017)

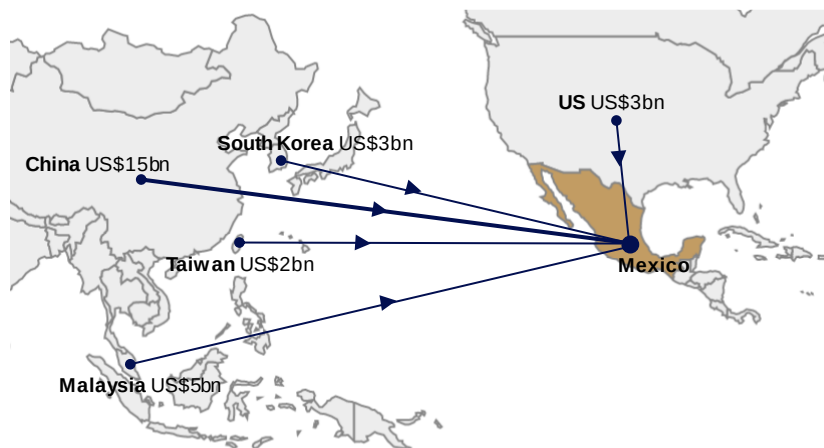
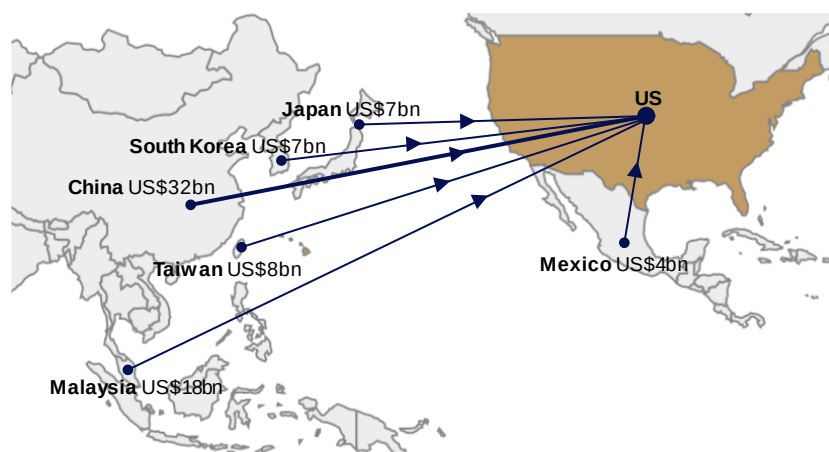


Figure 4 US' sources of intermediate electronics inputs (2017)²

In contrast, Japan accounts for only 7% of China's imports of intermediate electronics components. Indeed, Japan registered declines in exports of various electronics products in the past decade. Notably, its global market share of ICs is now only half of what they were just a decade ago. Over the same period, the global share of South Korea's exports of mobile phones likewise slumped from about 15% to less than 5%. Consequently, Japan is no longer the main source of ICs for South Korea and Taiwan, and the electronics supply chain linkages among the Northeast Asian economies (outside of China) have weakened considerably.

The ASEAN economies collectively account for a modest 20% of China's total imports of intermediate electronics inputs, with 8% from Malaysia alone. Specifically, Malaysia has a substantial share of 9% in China's IC imports and is also an important source of mobile phone parts. In addition, Thailand, the Philippines and Malaysia are major suppliers of HDDs to the production network centred on China, given the presence of the top global manufacturers including Western Digital, Seagate, Hitachi and Toshiba in the ASEAN region. Indeed, the three economies collectively account for more than 60% of China's HDD imports, with a third from Thailand.

Linkages among some ASEAN economies, namely Indonesia, Malaysia, Singapore, Thailand and the Philippines, have weakened somewhat with the emergence of China as the global electronics production centre. In particular, Singapore used to be a major source of both electronics components and final products for the region but has since ceded market share to China. However, these ASEAN countries traditionally have close industry ties that continue to result in considerable trade in components. For example, Singapore is the second largest source of ICs for Malaysia (after Taiwan) and Indonesia (after China). Malaysia also imports parts from Singapore and Thailand for its production of reader machines, which command a global share of about 15%. Similarly, Thailand sources ICs from Malaysia for its production of HDDs which accounts for about 18% of global exports.

Over at the US-Mexico supply chain, Mexico sources most of its intermediate electronics inputs from Asia despite the geographical distance (**Figure 3 and Table 1**). This reflects Asia's comparative advantage in the production of such inputs. China supplies 70% and 60% of Mexico's imports of PC parts and mobile phone components respectively, while Malaysia and China are the largest sources of ICs with a combined share of more than 50%, followed by

² An estimated 38% of the US' imports of intermediate electronics inputs are re-exported.

another 8–9% each from South Korea and Taiwan. Similarly, the US imports most of its intermediate inputs for domestic production of electronics final goods from Asia, especially China and Malaysia (**Figure 4 and Table 1**).

Rise of Vietnam

Among the Asian economies, Vietnam has seen the greatest intensification of electronics industry linkages with China, due to its adoption of a “China plus 1” production model. China outsources the production of electronics peripherals as well as components, notably headphones/earphones and PC parts, to Vietnam. These are mainly in the form of investments by small and medium-sized enterprises (SMEs) specialising in providing electronics manufacturing services (EMS). China is also sourcing more ICs from foreign semiconductor plants set up in Vietnam. As a result, China’s intermediate imports from Vietnam grew at a staggering 72% per annum (p.a.) in the last decade even as it seeks to increasingly source for inputs domestically. Accordingly, Vietnam’s share of China’s imports of intermediate electronics goods rose from near zero in 2007 to 5% in 2017.

Apart from China, South Korea’s electronics industries are also closely linked to Vietnam’s. South Korea has become one of Vietnam’s largest investors with companies such as Samsung and LG setting up production facilities in the country to tap on its proximity to China as well as its low-cost base. The companies specialise in the manufacture of mobile phones as well as intermediate parts using components and ICs imported from South Korea. The phones are then exported to end consumer markets while the parts are forwarded to China or sent back to South Korea for assembly into final products. As a result of these linkages, South Korea is now the largest source of ICs and second largest source of mobile phone components for Vietnam, as well as the second largest market for Vietnam’s exports of mobile phone parts.

With investments from China, South Korea and the US, Vietnam has seen phenomenal growth in its exports of mobile phones and printers/photocopiers in the past decade. Its share in world production of mobile phones at less than 10% is far below China’s 50% and the EU’s 20%, but is already almost on par with the US. Vietnam has also carved out a similar global share in exports of printers/photocopiers, overtaking Japan and the US.

Table 1 Trade in intermediate electronics products (2017)

US\$ Billion	Destination Economy:											
Source Economy:	USA	MXN	CHN	JPN	KOR	TWN	HKG	SGP	MYS	PHL	THA	VNM
USA		2.5	12.0	3.4	4.4	4.4	5.1	2.5	6.0	2.3	1.8	2.8
MXN	4.4		3.1	0.2	0.2	0.1	0.3	0.2	0.1	0.0	0.0	0.2
CHN	31.9	14.8		11.9	17.3	15.2	88.9	11.3	7.0	2.3	3.0	12.3
JPN	6.9	1.5	26.2		4.8	7.1	11.8	3.7	2.8	3.1	3.3	3.1
KOR	7.4	2.8	80.2	2.7		7.8	23.8	10.5	1.6	3.3	0.9	17.0
TWN	7.5	2.1	91.8	11.2	11.0		34.3	21.1	8.1	3.3	3.3	3.8
HKG	0.2	0.1	0.7	0.0	1.1	0.1		0.4	0.9	0.9	0.1	0.4
SGP	1.6	0.5	8.0	1.1	2.3	3.8	26.8		6.2	1.7	1.0	0.6
MYS	18.0	5.3	28.2	1.6	2.0	2.4	11.0	12.7		0.6	1.9	0.6
PHL	3.1	0.9	9.9	1.5	1.2	1.3	7.8	4.7	1.0		1.2	0.4
THA	2.3	0.8	7.5	1.3	0.7	0.7	4.1	1.8	1.4	0.6		0.8
VNM	3.6	1.3	18.8	0.4	4.0	0.5	4.9	0.6	1.5	0.2	0.2	

Source: UN Comtrade and EPG, MAS estimates

Vietnam's linkages with other ASEAN economies are modest compared to its ties with the Northeast Asian countries. Singapore was the only notable import source among them and accounted for one-fifth of Vietnam's electronics imports in 2007. However, this proportion fell significantly over the last decade to just 1.5% in 2017. Singapore previously supplied more than one-third of Vietnam's IC imports and almost half of PC imports, but Vietnam has switched to sourcing these products from South Korea and China, respectively.

Intermediary Role of Hong Kong and Singapore

In the regional trade in electronics products and components, Hong Kong and Singapore perform special roles as intermediary trade hubs. Due to its geographical proximity and extensive economic ties with China, Hong Kong has established itself as the redistribution hub for electronics exports, largely intermediate goods, to and from China. As a result, Hong Kong was able to grow its electronics re-exports by an average of 7.3% p.a. over 2007–16. It handles about 40% of China's IC trade and is the key gateway to China from the other Northeast Asian economies: Taiwan and Korea each route about a quarter of their ICs through Hong Kong while the proportion for Japan is about 15%. Consequently, Hong Kong has taken the top spot in global exports of ICs (almost entirely re-exports), overtaking Singapore since 2009. Indeed, Hong Kong's IC re-exports have now grown to 1.8 times those of Singapore.

In addition, most of China's imports of parts for office machines and mobile phone components are via Hong Kong. Overall, Hong Kong's re-exports to China constitute a considerable 44% of China's total electronics imports. As for China's exports to the rest of the world, the proportion that is shipped through Hong Kong is much lower at 24% and it has fallen from the peak of 30% in 2013. For example, China now exports about 20% of mobile phones through Hong Kong, compared to 40% previously.

Singapore acts primarily as a distribution centre for exports of electronics goods, in particular ICs, although the ASEAN economies have reduced their reliance on it as an intermediary over the last decade. Malaysia and the Philippines export about one-fifth and 10–15% of their IC products through Singapore respectively. Malaysia has established itself as the largest supplier of ICs to the US and Mexico, and has a share of 9% each in the IC imports of the EU and China. Malaysia's exports to Mexico are mainly channelled through the US, and a part of that trade comes through Singapore. Hence, Malaysia's significant role in these major markets has bolstered Singapore's re-exports. However, to meet the growing demand for ICs from China, Malaysia is forwarding more of its IC exports to Hong Kong instead while the Philippines has almost halved the proportion of ICs exported through Singapore over the last decade. As a result, Hong Kong now accounts for a sizeable 16% and 31% of their respective IC exports. Likewise, Singapore's IC re-exports to Malaysia and Thailand are now equivalent to roughly 15% of their respective imports, about 10% points lower than several years ago. In general, the regional countries are sourcing more directly from the Northeast Asian economies or via Hong Kong instead of importing from countries such as the EU and Japan through Singapore. Nevertheless, Singapore's IC re-exports to markets outside of China, including the US and EU, remain much larger than Hong Kong's, by about 1.3 times on average.

In addition, Singapore re-exports other electronics components and final products from China to the ASEAN countries. Singapore's re-exports account for the largest proportion of electronics imports into Indonesia (32%) and the lowest in Vietnam (5%). Vietnam instead imports mobile phone components, which accounts for 38% of its total electronics imports, mainly from China and South Korea.

For exports out of Southeast Asia, Singapore plays a much smaller role as a distribution centre, with notable volumes from only Malaysia. Malaysia ships to Singapore about 10% of the mobile phones, and 15% of PC parts. Among the HDD producers in the region, only Malaysia exports a small portion (of less than 10%) via Singapore.

In general, Singapore has adapted to the shifts in comparative advantage in electronics manufacturing worldwide by focusing on the high value-added activities in the global supply chain. Many of the world's top semiconductor companies have a presence in Singapore, which serves as their regional headquarters, research & development (R&D) centres or advanced wafer fabrication facilities. This has helped to entrench Singapore as a major global distribution hub for ICs and resulted in a rich domestic ecosystem of materials & equipment and EMS players. Indeed, Singapore accounts for as much as a fifth of the world's production of semiconductor equipment.

Services Linkages in Asia

The electronics trade flows have also facilitated the growth of services trade in the region. Embodied in every US dollar of Asia-11's electronics exports are 14 cents' worth of services imports, compared with 10 cents for manufacturing exports in general.³ Half of the services imports utilised by the electronics sector are in the trade-related categories of wholesale and retail trade (5 cents), and transport and storage (2 cents), in part reflecting the prevalence of cross-economy supply chains. Other business services and financial and insurance services account for another 3.0 and 1.6 cents, respectively.

Traditionally, Asia's manufacturing centres and some developed countries such as the US and Japan have dominated manufacturing-related services exports to the region. This trend reflects the trade flows, as well as the dominance of developed countries in the provision of services and their importance as a source of some high-tech intermediate inputs into Asia's manufacturing sector. Within Asia, Hong Kong and Singapore have also emerged as important transport hubs and financial centres. More recently, however, they are facing a challenge from China in trade-related services, and their market shares have declined by 0.6–0.7% point each over 2007–2015. Nevertheless, Singapore has continued to expand its market share in modern services, particularly other business services⁴ and information and communications services.

Alongside its transformation into the factory of the world, China has been rapidly gaining market share in the services arena. It is increasingly meeting more of its own demand for services, which were previously imported. Over the period 2007–2015, the domestic services value added (VA) content of China's electronics exports grew by 12.8% p.a., against growth of only 2.3% p.a. for foreign services VA content. As a result, China met two-thirds of its own electronics export sector's needs for services in 2015, up from 48% in 2007. These trends in part reflect the deepening of China's supply chains over the late 2000s, which led to greater domestic sourcing of inputs and thus a correspondingly higher contribution by supporting services sectors. China has also made considerable inroads into Asia-11's import market for electronics services. Over the past decade, its market share has more than doubled from 6% in 2007 to 12.4% in 2015 (**Chart 1**). Its gains were mainly at the expense of losses by

³ The Asia-11 economies are China, Hong Kong SAR, India, Indonesia, Korea, Malaysia, the Philippines, Singapore, Taiwan, Thailand, Vietnam. Given the lack of detailed data on electronics-related services exports, the value added content of services embodied in electronics exports (in 2015) reported in the OECD TiVA database is used as a proxy.

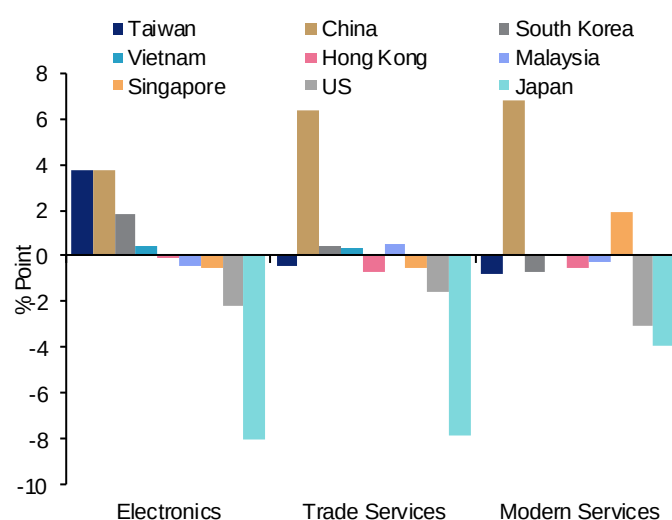
⁴ Other business services include legal and accounting services, activities of head offices, and research and experimental development.

developed countries such as Japan and the US, while the other Asia-11 economies largely recorded stable or slight declines in their market shares.

3 Post-tariff Shifts in Electronics Trade Flows

Since 2018, the US has imposed tariffs on Chinese products worth US\$370 billion, including final electronics goods such as mobile phones and laptops, as well as intermediate products such as semiconductors and computer parts. In response, China implemented retaliatory tariffs on about US\$110 billion of US products, including electronics goods. While there has been some de-escalation in trade tensions with both countries allowing some tariff exemptions, trade barriers are still significantly higher compared to 2017. Moreover, the threat of a re-escalation in trade tensions remains. As such, companies have begun to reconfigure their global electronics supply chains, taking into account both the impact of higher tariffs, as well as the risk of increased trade barriers. This section addresses the impact of higher US tariffs on global supply chains by tracing through corresponding changes in trade flows and market shares.⁵

Chart 1 Change in share of foreign VA in Asia-11's electronics-related exports by category (2007–2015)



Source: OECD TiVA Database and EPG, MAS estimates

In analysing the impact of higher US tariffs on Chinese goods, both direct and indirect effects are considered. First, the tariffs have a direct effect on the countries from which the US sources electronics products. As Chinese goods become more expensive, the US would likely either import more from other countries or increase domestic production. Second, as US purchases of Chinese goods fall, China will demand less inputs from its suppliers, thus indirectly leading to declines in their exports. Conversely, other countries that have gained market share will increase their imports of intermediate products from their suppliers.

To assess the shifts in trade flows in the post-tariff period, the changes in market share of US imports for 17 economies between 2017 and 2019 are computed. They cover the entire

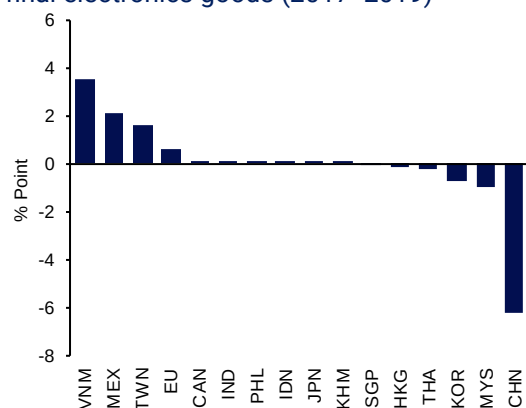
⁵ See Box A of the April 2019 issue of the *Macroeconomic Review* for an analysis of the impact of US-China tariffs and ongoing supply chain shifts on trade and production patterns in Asia based on a computable general equilibrium model.

gamut of the production and distribution networks in Asia—China, Japan, Korea, Taiwan and Hong Kong, as well as the ASEAN economies of Brunei, Cambodia, Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam. In addition, the main trading partners of the US are considered—Canada, the EU, Mexico and India.⁶ The changes in market shares are calculated for final electronics goods as well as intermediate products, based on disaggregated trade data at the six-digit HS (Harmonised Commodity Description and Coding System) level.

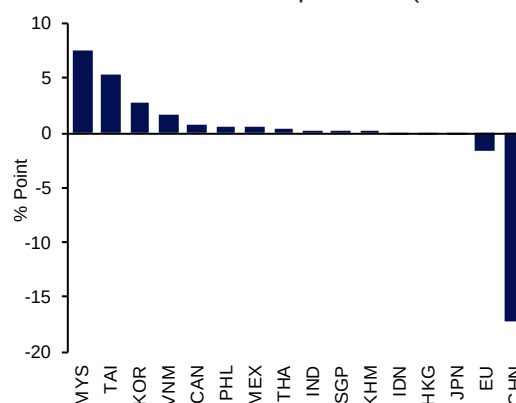
In the final electronics goods category, China was badly hit by US tariffs, suffering a sharp 6.3% point decline in its market share of US imports. Nevertheless, it remained the US' most important source of final electronics products and continued to supply more than half of its imports. Vietnam saw the largest gain in market share, of 3.6% points, followed by Mexico with 2.2% points, and Taiwan, with 1.7% points (**Chart 2**). Vietnam is a key beneficiary of production relocation from China, and has experienced a surge in FDI inflows into its manufacturing sector since mid-2018, with a notable increase in new projects originating from China. Mexico, which as noted above is the second largest supplier of final electronics products to the US after China, also gained significantly from trade diversion, given its proximity to the US and favourable tariff treatment under the US-Mexico-Canada Agreement (USMCA). Meanwhile, Taiwan has benefited from the accelerated reshoring of manufacturing lines from China.

Turning to the intermediate goods space, China witnessed a hefty 17.2%-point reduction in its share of the US import market, while Malaysia and Taiwan recorded the largest gains, of 7.4% points, and 5.3% points, respectively (**Chart 3**). The trade diversion to Taiwan again reflects the reshoring of production lines, as well as its competitive strengths in higher value-added upstream products. Meanwhile, Malaysia has traditionally been an important producer of intermediate electronics components and accessories, and has seen a surge in approvals for foreign investment in the electrical and electronics industry over the past two years. While Malaysia's technological capabilities still lag that of more advanced Asian economies such as Korea and Taiwan, its openness to FDI, relative availability of skilled labour and good transport networks stand out among the ASEAN economies. It is also noteworthy that Mexico did not gain significant market share in US imports of intermediate goods, in contrast to its advance in final goods. Although Mexico has had considerable success in attracting lower value-added production, it has fared less well in drawing investments in higher value-added upstream electronics manufacturing, in part reflecting its relatively unskilled workforce and weak supporting infrastructure.

⁶ Together, these 17 economies account for 99% of US imports of electronics. An important caveat is that not all of the post-2017 changes in market shares are necessarily due to the US trade tariffs.

Chart 2 Change in US import market shares for final electronics goods (2017–2019)

Source: ITC Trade Map, US Census Bureau and EPG, MAS estimates

Chart 3 Change in US import market shares for electronics intermediate products (2017–2019)

Source: ITC Trade Map, US Census Bureau and EPG, MAS estimates

Next, the indirect impact of higher tariffs on the intermediate input suppliers of final goods producers is examined. To do this, the changes in the sources of intermediate electronics imports in the top four exporters of final electronics goods to the US, namely China, Mexico, Vietnam and Taiwan, are examined.⁷ South Korea and Malaysia experienced the most significant improvements in market share in Mexico's imports of intermediate electronics, while Japan, the EU and China were the largest gainers in the Vietnam market. As for Taiwan, it sourced more intermediate imports from China, Malaysia and Vietnam, with these countries experiencing increases of 2.4–3.2% points in their market shares. Meanwhile, Vietnam, Taiwan and Malaysia also registered gains of 0.8–1.8% points in their respective shares of China's imports of intermediate electronics inputs, which, contrary to expectations, had increased in spite of a decline in exports of final electronics goods to the US. This suggests that the impact of China's efforts to enhance its domestic manufacturing capabilities more than offset the negative effects arising from US tariffs. Overall, the economies receiving the largest boost to their intermediate inputs trade are Vietnam, Taiwan and Malaysia.

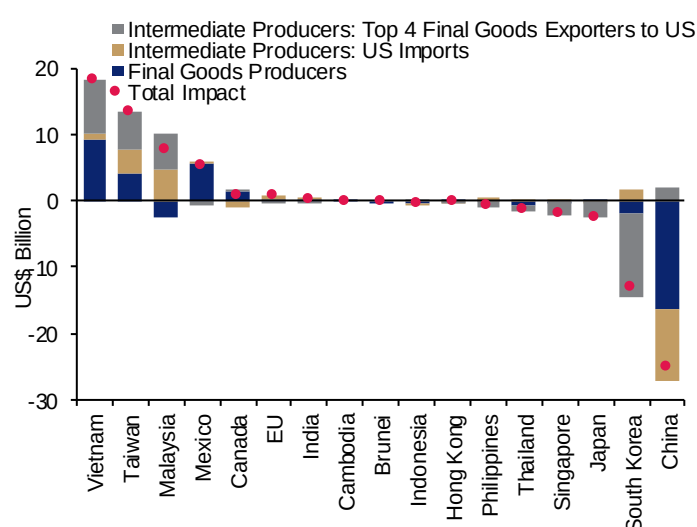
Chart 4 presents the total impact of the post-2017 market share changes, summarising the differences in each economy's 2019 electronics trade flows, using 2019 market shares *vis-à-vis* 2017 market shares. The direct impact of the tariffs is made up of the effects on US imports of final goods (blue bars) and of intermediate inputs (gold bars). The indirect impact comprises the changes in the economies from which the final goods exporters sourced their intermediate inputs (grey bars). When both the direct and indirect impacts are taken into account, Vietnam, Taiwan and Malaysia are the top beneficiaries. Meanwhile, Mexico comes in at fourth place due to its limited gain in market share of intermediate products, given that its electronics sector is geared towards downstream production. Vietnam showed increases in both final and intermediate electronics products, but Taiwan and Malaysia benefitted mainly from direct and indirect gains in intermediate electronics products.

In addition to importing from alternative sources, the US is also partially meeting its demand for electronics products by increasing domestic production, particularly for final goods. US production of final goods is estimated to have increased by an average 5.1% p.a.

⁷ As import data for Mexico and Vietnam is available only up to 2018, the analysis assumes that trade flows and market shares in 2019 are the same as in 2018.

in the past two years, compared with 3.9% p.a. in the prior five years. The country's output of intermediate electronics products grew by a robust 6.2% p.a. in 2018–2019, although this is still slower than the average of 8.6% p.a. registered in the preceding five years. Meanwhile, in China, there are signs that the share of domestically-produced intermediate products in overall electronics manufacturing has risen. While the production of final goods such as mobile phones and displays have contracted in the last two years due to US tariffs, the output of ICs has continued to expand at double-digit rates. This trend is likely to be a reflection of China's ongoing efforts to move up the supply chain, expedited by the trade tensions. Thus, instead of exporting final goods to the US, China can supply upstream intermediate inputs to the other producers of final goods.

Chart 4 Estimated change in electronics trade flows due to shifts in market shares between 2017 and 2019



Source: ITC Trade Map, US Census Bureau and EPG, MAS estimates

All in, it appears that the major nodes in Asia's electronics supply chain have remained broadly intact, although there has been some re-organisation of production away from China and towards manufacturers elsewhere in Asia, particularly Vietnam, Taiwan and Malaysia. Meanwhile, China appears to be adjusting to the tariffs by shifting production away from final goods and towards intermediate products. There is also tentative evidence of in-sourcing by the US and gains by Mexico, which suggest that the tariffs have catalysed the growth of the US-Mexico electronics production network.

4 Conclusion

The increased US-China trade barriers and technological restrictions in the last two years have raised the prospect that China and Asia's China-centric electronics production network will cede market share in the US market, with the US-Mexico supply chain gaining prominence instead over time. At the current juncture, the Asian supply chain is more mature, accounting for a dominant share of global electronics production, in both final and intermediate goods. The advanced development of Asia's production chain gives the region a competitive advantage over the US-Mexico one, and the range and sophistication of the firms involved would not be easily duplicated. In addition, upstream, mid-stream and downstream producers are all found in the region, clustered together to benefit from economies of agglomeration and scope.

Nevertheless, the US-Mexico supply chain could grow and become more sophisticated over time, even as Asia's production capabilities evolve. There are four key factors that underpin the competitiveness of supply chains: production costs, tariff barriers, human capital endowment and innovative edge. Beginning first with business costs, it remains the case that electronics goods are more cheaply produced in Asia than in US-Mexico. For every US dollar of output, unit business costs (i.e., excluding material costs) in the former amounted to only half of those in the latter—22 cents vs 48 cents.⁸ The difference is due largely to wages, which are 5 cents in Asia per US dollar of output, compared to 21 cents in US-Mexico, as a result of high labour costs in the US. The cost of supporting services in Asia is also considerably lower, reflecting the efficient provision of such services by Hong Kong and Singapore.

Second, intraregional tariffs on intermediate electronics products make it more costly for the Asian economies to source for inputs from each other. At present, the bilateral tariffs levied in the region are mostly around 4–5%. In comparison, the USMCA together with its predecessor NAFTA has effectively removed tariffs on the flow of electronics products between the US and Mexico in the North American supply chain. Third, the US is far ahead of Asia with regard to human capital endowment, with a much greater availability of skilled and high-quality workers. Correspondingly, its labour productivity level in the electronics sector is close to five times that of Asia. US universities continue to award the largest number of doctoral degrees in science and engineering (S&E) (39,900 in 2015) in the world. Nevertheless, China appears to be rapidly catching up, although from a low base. The number of S&E doctoral degrees awarded by universities in China rose from just 7,800 in 2000 to 34,400 in 2015. If Korea and Taiwan are included as well, the region's universities have awarded more S&E degrees than US since 2008, and collectively produced 42,900 S&E doctorates in 2015.

The US-Mexico electronics supply chain has the strong advantage conferred by the technological and innovative edge of the US. The US is the world leader in high-technology industries and remains highly invested in emerging technologies. Thus, it has the capability to increase the production of higher value-added intermediate goods, such as ICs for new applications like AI and 5G. Notwithstanding the advances made by China, the US continues to lead in the number of patent applications in the electronics sector, in both hardware and software.

Fourth, the US-Mexico supply chain in electronics production is supported by lower tariffs, higher quality workers and especially its dominant position in innovation. However, its cost base is significantly higher than Asia, which also holds the incumbent advantages of greater firm diversity and nimbler producer-supplier relationships. It is also unlikely that the region's labour cost advantage will be eroded over the short term. It is thus the case that both regions will remain as major producers and consumers of electronic products, even as important shifts in comparative advantage take place within Asia, giving rise to new opportunities for intra-industry specialised trade across the region.

⁸ The cost comparison is based on US Bureau of Economic Analysis data on the activities of US multinational enterprises.

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Special Feature B

Regulation, Technology and the Banking Sector

Amit Seru¹

Intermediation in the lending market has undergone a dramatic shift from traditional banks to shadow banks, i.e., non-depository institutions that fall outside the scope of traditional banking regulation. I trace the growth of shadow banks to the increased regulatory burden faced by traditional banks and financial technology adopted by shadow banks. Assessing financial stability in this new era involves understanding the business model of FinTech shadow banks and traditional banks, the industrial organisation of the credit market, and the equilibrium interaction of intermediaries. I conclude by illustrating and emphasising that a regulatory policy analysis requires the impact of the policy on banks and shadow banks to be examined side by side.

1 Introduction

Financial regulation and supervision, in large part, concerns itself with traditional banks. This “banking-centric” view works under the belief that a well-functioning and stable banking system is critical for channelling funds from savers to users in any economy. Banks generally engage in maturity transformation, taking in funds that are typically short-term, such as deposits, to fund loans that are longer-term. Regulatory policy is expected to generate outcomes based on these beliefs. For instance, when regulators raise the capital requirement to curtail risky lending, the expectation is that credit supply in the economy would contract as banks cut lending. I argue that this approach to policy analysis gives an increasingly incomplete picture and requires a serious rethink.

The reason that such policy analysis fails is that intermediation in the lending market has undergone a dramatic shift due to the entry and growth of shadow banks (Claessens *et al.*, 2018; Seru, 2019). These non-banks are not funded by depositors and therefore are not subject to traditional bank regulation. They also rely on technology and data analytics as being central to their business model (BIS, 2019). Moreover, because they compete with banks on price and non-price dimensions in some markets and not in others, it is critical to understand the industrial organisation of the credit market to better appreciate their equilibrium interaction. Thus, any regulatory policy analysis requires that the impact of the policy on banks and shadow banks be analysed side by side.

In this article, I start by discussing the dramatic changes in the lending market due to the growth of shadow banks. I argue that the growth of shadow banks can be traced to the

¹ Amit Seru is affiliated with the Stanford Graduate School of Business, Hoover Institution, NBER, SIEPR and CEPR. This article is based on joint work with Greg Buchak, Gregor Matvos and Tomasz Piskorski, and his remarks at the Andrew Crockett Lecture at the Bank for International Settlements in June 2019. Contact: aseru@stanford.edu. Professor Seru visited MAS in December 2019 as the MAS-NUS Term Professor in Economics and Finance. The views in this article are solely those of the author and should not be attributed to MAS.

increased regulatory burden faced by traditional banks and to the technological changes adopted by shadow banks, which also explain changes in credit markets around the globe. I then illustrate why assessing financial stability in this new era involves: (i) understanding the business model of shadow banks, many of them FinTech shadow banks, and traditional banks; (ii) the industrial organisation of the credit market; and (iii) the equilibrium interaction of intermediaries. I conclude by emphasising these elements in the context of capital regulation and unconventional monetary policy changes, taking the US as an example.

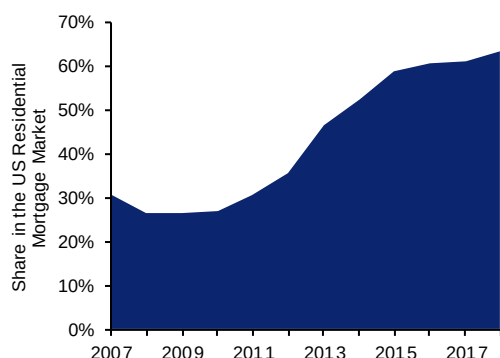
2 Intermediation in Lending Market: The Rise of Shadow Banks

United States:

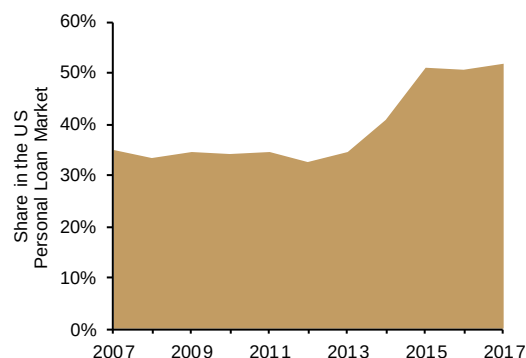
General Trends

In the last decade, the consumer finance market has undergone a dramatic change. As a starting point, consider the residential mortgage market in the US, which is the world's largest consumer finance market. More than 50 million residential properties currently have mortgages outstanding with a combined debt of about US\$10 trillion. As can be observed, the market share of shadow banks in residential mortgages has more than doubled from 2007 to 2017 in **Chart 1**. A substantial portion of this growth is from online "FinTech" lenders that rely on technology. **Chart 2** shows that a similar trend is visible in the US consumer personal loan market.

The growth of shadow banking has been visible beyond consumer finance. **Table 1** provides data on the rising prominence of shadow banks in small business lending, leveraged lending (loans to non-investment grade businesses), and commercial real estate consumer lending. It also provides information on mortgage loan market (both origination and servicing), personal loans and student loans. As of 2015, these six key lending segments (with US\$12 trillion loans outstanding) had around 40% of loans that were associated with shadow banks. I now elaborate on a few of these markets in some more detail.

Chart 1 Shadow banks in the US residential mortgage market

Note: This figure shows the shadow bank origination share in the US residential mortgage market. It plots shadow bank origination share as a fraction of total originations for all mortgages in Home Mortgage Disclosure Act (HMDA) data between 2007 and 2018. The method used to construct this figure is based on Buchak *et al.* (2018a).

Chart 2 Shadow banks in US personal loan market

Note: This figure shows the shadow bank origination share in the personal loan market in the US. It plots shadow bank issuance shares as a fraction of total personal loans. The data comes from a large credit bureau.

Table 1 Shadow banks across different markets in the US

Type	Market Size (US\$ Billion)	Market Type	% Inside Banking System	% in Banking System at Risk	Select Disruptors/ New Entrants	Competitive Advantage
Unsecured personal loan	843	Loans outstanding	81	31	Lending Club, Prosper	Regulatory, technology
Small business loan	186	Loans outstanding	95	100	On Deck, Kabbage	Technology (time, convenience)
Leveraged lending	832	Loans outstanding	7	34	Alternative AM, BDCs	Regulatory
Student lending	1,222	Loans outstanding	5	100	SoFi, Earnest, CommonBond	Regulatory, technology, convenience
Mortgage origination	1,169	Annual volume	58	100	Quicken, PFSI, Freedom	Regulatory, convenience
Mortgage servicing	6,589	Loans outstanding	73	6	OCN, NSM, WAC	Regulatory, cost
CRE lending	2,354	Loans outstanding	56	9	Commercial REITS, alternative lenders	Regulatory, market dislocation
Total	13,195	-	59	20	-	-

Note: This table shows the breakdown of banks and shadow banks market size in different markets: unsecured personal loans, small business loans, leveraged loans, student loans, residential mortgage loans and commercial real estate loans. The fourth column presents estimates of how much of the lending as of 2015 is done by traditional banks. The fifth column presents estimates of how much of the lending by traditional banks is at risk by shadow banks. Data are based on Goldman Sachs Global Investment Research.

US Corporate Loan Market

The corporate lending market has seen a big change in the aftermath of the financial crisis. In particular, there has been an increase in leveraged loans over the last decade. Leveraged loans are debt taken by firms with below investment grade credit ratings. As the name suggests, these loans are often granted to companies with a high leverage ratio. The market for new leveraged loans in the US has increased by over 40% between 2013 and 2017, when a record high of US\$1.03 trillion were issued. Much like other parts of the lending landscape, non-banks have accounted for a substantial portion of this increase, especially the most aggressive kinds. Prominent non-bank financial firms, such as Jefferies, Macquarie, KKR and Nomura have together claimed more than 10% of the market in 2017.

Regulators have closely watched the lending in this market by banks. For instance, in 2013, the Federal Reserve, OCC and FDIC issued guidance on what was acceptable leverage, restricting firms such as JPMorgan and Bank of America from participating in the riskiest deals. This regulation constrained banks and allowed shadow banks to step in when banks retreated. In addition, the non-bank lenders tend to provide borrowers a greater choice of debt products, such as those with equity-like features, than what banks have typically offered.

Incidentally, the rise of shadow banks is visible not only at the risky end of the corporate bond market. Irani *et al.* (2018) study the rise of shadow banking in the corporate syndicated loans market and show that shadow bank funding rose from about 20% in 1992 to 70% in 2014. The study also finds that capital regulation on banks played an important role in the rise of non-bank funding: non-banks stepped in for loans with higher capital requirements and at times when capital is scarce. While more non-bank funding may suggest that risks have declined in the banking sector, risk may simply have moved to investors' pension funds, mutual funds and insurance.

Shadow banks have also made headway in corporate loans for small and medium business enterprises. Small businesses make up almost two-thirds of all new private-sector jobs, but typically have smaller needs. For instance, a US\$100,000 loan is too small for big banks to bother with, but too large for a personal loan for most business owners. Online lenders like Kabbage have stepped into this untapped market. Many traditional banks deny customers with limited or no credit history as well as those with no credit history. Kabbage, instead, looks at credit score but also uses big data on the health of businesses in its determination for approval. Its model considers a company's sales, shipping costs, business software, cash flow information of suppliers and customers and activity on social media, including its online "reputation". Analysing this data enables them to obtain a better picture of business health. The assessment of alternative factors beyond the facades of credit history can often supplement those with limited credit history or mitigate concerns about those with questionable credit. In addition, fully automated lending solutions from online lenders removes the age-old hurdle of normal business hours, offering companies 24/7 access to working capital online. Data science and technology-based solutions have thus simplified arduous financial processes and expanded the market.

Other Markets:

Shadow Banking in China

Estimates from various sources (e.g., Moody's) suggest that the shadow banking sector holds about a third of all banking assets in China. According to the Financial Stability Board,

China's shadow banking has grown by more than 30% per year over the last three years compared with 10% in the rest of the world. In terms of composition, a large share of shadow banking involves wealth management products (WMP) which have grown rapidly in the last five years. This growth outside the banking supervision orbit has been attributed in part to regulation (Hachem, 2018).

The picture on China's shadow banking would be incomplete without touching on the rapid growth of FinTech firms that have relied on technology. The quintessential example here is Yu'eobao, owned by Alibaba Group. Yu'eobao, as a money market fund, has removed the entry barriers that bar most small investors from getting returns higher than bank deposits. Thanks to the absence of barriers, one can invest as little as 0.1 yuan, which would be unimaginable for conventional funds that retail through bank branches. Yu'eobao retails through the PayPal-like Alipay platform of Alibaba. Alipay, the payment tool of choice for hundreds of millions of online shoppers who use Alibaba's online marketplace Taobao, functions as a virtual wallet and provides an entry point for many of Yu'eobao's investors.

Another important aspect contributing to the rise of China's FinTech firms is credit scoring using digital footprints. For example, Sesame Credit in China, run by Alibaba affiliate Ant Financial, is the leading Chinese "social credit" rating firm with 520 million users. Sesame Credit gives users a score based on five dimensions of information: personal information, payment ability, credit history, social networks and online behaviour. Together with Tencent, which has also pioneered a credit score, these FinTech firms have exploited high mobile penetration in China and opened online markets for a large unbanked population in China.

3 Why the Rise of Shadow Banks?

As was evident in the discussion of various markets in the US and elsewhere, the growth of shadow banks and FinTech lenders in the lending landscape has been attributed to two main factors—increased regulation on the financial sector, especially in the aftermath of the Great Recession, and breakthroughs in technology related to big data and data analytics.

Regulatory Burden

The broad idea here is that in the aftermath of the crisis, tightened regulation, increased supervision and heavy fines and penalties prompted banks to cut risky lending, invest in more liquid assets and maintain higher equity capital. As a result, banks were reluctant to lend to less-than-stellar credit users. Shadow banks operating in a relatively lightly regulated environment seized the opportunity and have fulfilled the pent-up consumer demand.

This observation is supported by empirical analysis. For instance, Buchak *et al.* (2018a) exploit regional variation in different types of regulatory and supervision pressure faced by banks engaged in mortgage lending from 2008 to 2016, including the implementation of Basel III with respect to mortgage servicing rights, and find that shadow banks increased their market share across regions during this time period (see Seru, 2019). However, banks reduced mortgage lending more in regions where regulatory and supervisory pressure on banks was higher. These were also regions where shadow bank activity was highest.

This type of finding—that regulatory pressure on banks lead to growth of shadow banks—is evident for other markets as well. For instance, see Irani *et al.* (2018) for evidence from the

corporate loan market in the US and Hachem (2018) for shadow banking related to WMPs in China.

Technology Improvement

The argument here has been that improvements in technology have allowed FinTech firms to provide banking services in different ways from traditional banks. Broadly, improvements in technology have allowed some FinTech firms to provide the same services cheaply and to create new markets by expanding their borrower pool. This has involved attracting consumers to banking services by using mobile phones and convenience apps as an entry point. For instance, consumer-to-consumer payment apps such as PayPal and Venmo initially attracted millennials due to the ease of phone transactions and eventually moved to providing deposit-like services.

Data science has also been shaping the lending market, opening doors that were previously closed to credit-constrained consumers with limited or tarnished credit histories. With big data and AI, FinTech lenders are able to use different information, such as their digital footprint on social media, in the underwriting process to evaluate borrowers' default likelihood. This has allowed both credible borrowers to pay a lower interest rate as well as opened doors for the unbanked population. Another new market that has been made possible due to technology and data science is "peer-to-peer" lending. This breaks away from the conventional investor-borrower framework, drawing resources from a large number of ordinary people to fund others with financial needs. Consumers can participate on both sides of the market as investors or as borrowers.

Finally, FinTech have leveraged on technology and data science to provide new services to existing customers. In particular, they have been able to offer "convenience" to consumers who might have high willingness to pay for such services. For example, Venmo offers consumers who want to make payments to other consumers the ability to pay swiftly via their mobile phones without having to go through a cumbersome process of writing and cashing checks or wiring money through banks. Similarly, Quicken Loans climbed to become the largest US residential mortgage lender by 2017 through the use of its convenient "Rocket Mortgage" product that enables a full online application process and allows consumer to provide all "relevant" information quickly. Buchak *et al.* (2018a) show that all this translates into Quicken Loans being able to substantially cut down the time it takes to originate and sell the loans relative to traditional lenders. In addition, Fuster *et al.* (2018) show that FinTech lenders process mortgage applications faster and adjust supply more elastically than other lenders in response to mortgage demand shocks, which suggests that technological innovation may have improved the efficiency of financial intermediation in the mortgage market.

4 A Proposal for Financial Regulation

I have traced the rise of shadow banking and, in particular, FinTech lenders and argued that regulation on banks and technological improvements are likely the two most important factors behind this growth. How should regulatory policy targeted at financial stability be designed in such an environment?

In the spirit of the famous Lucas critique, I argue that such an endeavour needs to: (i) understand the business model of FinTech shadow banks and traditional banks; (ii) the

industrial organisation of the credit market; and (iii) the equilibrium interaction of intermediaries. Such an approach will help us better understand what activities will migrate between banks and shadow banks in response to different policies. It will also allow a quantitative assessment of the extent of this migration and the reasons for it.

Let me illustrate the importance of these steps through the example of the US mortgage market where data availability allows us to delve deeper into these issues.

Illustration: US Mortgage Market

Business Model

Traditional banks take deposits and use them to make loans, including mortgages. At the same time, they are heavily regulated and subject to strict requirements to hold capital against the loans they keep on their balance sheets. In the mortgage market, they have a choice: They can sell mortgages to government-sponsored enterprises (GSEs), collecting an origination fee and, in some cases, a fee for servicing the mortgages. Or they can hold mortgages on their balance sheets, collecting interest and principal until the loans are paid off, but take the risk that borrowers will default. The better capitalised they are, the greater their capacity to hold mortgages.

By contrast, shadow banks do not take deposits and are lightly regulated. They generally lack the balance sheet capacity to keep the mortgages they originate. Their business model is “originate-to-distribute”, that is, to make mortgages and sell them to the GSEs. Shadow banks sell virtually all their loans to GSEs while traditional banks only partially do so (Seru, 2019). Finally, given the business model of FinTech shadow banks, as noted earlier, they are more active in the refinancing market, where they are better able to exploit their comparative advantage with data.

Industrial Organisation

While the US residential mortgage market constitutes the world’s largest consumer finance market, its structure is very unique and reflects the special role the federal government plays in promoting home loans. To make mortgages more widely available, Congress created Fannie Mae and Freddie Mac, private GSEs that buy home loans from lenders and package them as mortgage-backed securities (MBS) for sale to investors, guaranteeing payment if borrowers default. However, the GSEs only buy loans up to a limit, called the conforming limit, that has varied over time and by geography. Mortgages above that limit are classified as jumbo loans and are not eligible for purchase by the GSEs. Before the GFC, these loans could be sold to private investors, including investment banks such as Lehman Brothers. However, the market for selling these loans has evaporated since the crisis. Instead, jumbo mortgages are usually held by lenders on their balance sheets.

The differing structures of banks and shadow banks has had an important implication on where shadow banking has expanded. In particular, banks have lost a significant share to shadow banks in the conforming loans market because the latter can sell mortgage loans to GSEs. However, this is not true in the jumbo loans market where, as noted earlier, the market for “selling” the loans is non-existent. The share of banks in the jumbo loan market remained relatively stable after 2007 and only began to decrease slightly over the last five years (Seru, 2019). However, where GSE financing is available, banks have a much lower share.

Finally, there is an interesting interaction of these patterns with the financial health of traditional banks. Well-capitalised banks tend to keep more loans on their balance sheet, holding regulation constant. We therefore see that traditional banks altered their business model to retain more loans on their balance sheet as their capitalisation improves. These facts reinforce the claim that understanding the industrial organisation of the market and business models of banks and shadow banks is critical to gain insight on the type of activities that will migrate from traditional banks to shadow banks.

Equilibrium Interaction

A quantitative policy evaluation requires one to take the information on different business models and industrial organisation of lending and embed these in a framework where we can study this equilibrium. I will describe briefly one such framework that is formalised in Buchak *et al.* (2018a and 2018b).

We model the supply side by considering different types of lenders who compete for mortgage borrowers—traditional banks, non-FinTech shadow banks and FinTech shadow banks. Following our discussion, these lenders differ on several dimensions: the regulatory burden faced by traditional banks, origination costs due to different funding structure and operations, and product quality (for instance, convenience). Traditional banks have access to lower funding costs (from deposits) than shadow banks, but face higher regulatory costs. On the demand side, borrowers choose mortgages from the three types of lenders to maximise utility, which depends on the mortgage interest rate and non-price attributes such as convenience/quality.

Equilibrium pricing by each lender and the mark-ups are determined endogenously as lenders try to maximise their profits given demand. Shadow banks sell all the loans they originate while traditional banks decide whether to sell or retain the loans on their balance sheet, depending on their funding costs (among other things), which in turn depend on their financial health. Shadow banks compete on price and non-price attributes with traditional banks in some segments (conforming market) but not in others.

In Buchak *et al.* (2018a) we are able to exploit the joint movements of banks' market share and relative pricing to estimate important parameters of this model. Two parameters in the model are important for explaining patterns in the share of shadow banks and FinTech shadow banks over time. The first characterises the regulatory burden on banks while the second represents product quality (e.g., convenience) of FinTech shadow banks.

By assessing changes in market share and differences in relative pricing of traditional banks relative to shadow banks, one is able to get insights on the regulatory burden faced by banks. For instance, one might imagine that the increase in market share of shadow banks relative to traditional banks might be due to their lower prices (due to differences in funding costs). However, all else equal, one finds no differences in prices between banks and shadow banks. The increasing regulatory burden on banks over time can, instead, explain the pattern of increasing shadow bank share without directly mediating through prices (Seru, 2019).

Similarly, one can successfully explain the rise of FinTech market share through the higher product quality these lenders offer. For instance, one might imagine that the increase in market share of FinTech shadow banks relative to non-FinTech shadow banks might be due to their lower prices. However, all else equal, one finds that prices of FinTech shadow banks are in fact higher than those of non-FinTech shadow banks. The increasing product

quality by FinTech shadow banks over time can, instead, explain the pattern of increasing FinTech shadow bank share, without directly mediating through prices (Seru, 2019).

Using the model, one can thus isolate how much of the increase in market share of shadow banks was due to the regulatory burden on banks and how much to improvements in technology that allowed for improved product quality. Our estimates in Seru (2019) suggest that regulation accounts for roughly two-thirds of the growth while technology accounts for roughly the remaining one-third.

Counterfactual Policy Analysis

Regulation and technology played a crucial role in the shadow bank market penetration of the mortgage lending market, driving the equilibrium interaction between traditional and shadow banks. Shadow banks strategically compete more in markets where they have a technological advantage and where traditional banks are hampered by regulatory burden. Shadow banks also compete with traditional banks in markets where they are able to operate their “originate to distribute” model. Finally, banks exploit their comparative advantage of “balance sheet capacity” by deciding whether to finance loans themselves or by following an “originate to distribute” model like shadow banks. This *integrated view* of financial intermediation has important implications for the role of policy in ensuring financial stability. I will illustrate this by discussing their importance in the context of two important policy levers used in recent times.

Changes to Bank Capital Requirements

As one illustration, consider the effects of changing bank capital requirements on risk in the traditional banking system (loans retained on bank balance sheet) as well as overall lending in the economy.²

Raising capital requirement blunts the comparative advantage of traditional banks in balance sheet capacity, and they shift from retaining loans on their balance sheet to selling them. Since selling of mortgages is only available for conforming loans, this shifts bank lending from the jumbo to the conforming market and lowers the share of mortgages retained on bank balance sheets. While the policy may appear to lower risks on bank balance sheets, it may not have reduced systemic risk in the financial system.

To illustrate this, we simulate a capital requirement increase from 6% to 7.5% in our model, with results shown in **Table 2**. We see a significant decrease in bank’s balance sheet lending. However, most of the reduction is compensated by: (i) banks moving from originating and holding to instead selling to GSEs (on conforming mortgage side); and (ii) shadow banking increasing lending volume. As a result, total lending decreases only by a modest US\$13 billion.³ Tightening capital requirements force banks to move from loan retention to adopting the originate-to-distribute model of shadow banks, while shifting lending activity from traditional banks to shadow banks. Overall, considering bank behaviour alone overstates the reduction in overall mortgage volume.

² Buchak *et al.* (2018b) examines this using the integrated model of intermediation discussed above.

³ Since shadow banks would become more dominant, higher capital requirements would also move mortgage credit risk off bank balance sheets to the GSEs and indirectly to the US Treasury.

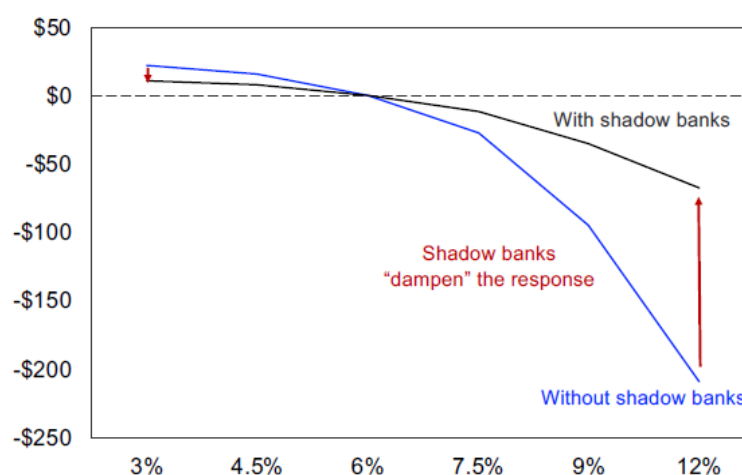
Table 2 Counterfactual analysis: change in lending in response to change in capital requirement faced by traditional banks from 6% to 7.5%

Lender	Loan Type	Financing Source	Change (US\$ Billion)
Total	-	-	-13
Bank	Jumbo	Balance Sheet	-38
Bank	Conforming	Balance Sheet	-204
Bank	Conforming	GSE	+215
Shadow Bank	Conforming	GSE	+14

Note: This table shows the change in mortgage origination volume (in US\$ billions) by banks and shadow banks when capital requirement increases from 6% to 7.5% based on the model calibrations described in the text. The table further breaks down the mortgage volume change into jumbo and conforming loan volume change. Data are based on calculations in Buchak *et al.* (2018b).

A more general aggregate lending volume change in response to changes in capital requirements for traditional banks is illustrated in **Chart 3**. As can be seen, an integrated view that considers the behaviour of both banks and shadow banks side by side reveals a quantitatively large *dampened* effect of the policy relative to one that only focuses on effects of the policy on traditional banks.

Chart 3 Counterfactual analysis: lending response to changes in capital requirements of traditional banks



Note: This figure shows the aggregate mortgage origination volume (in US\$ billions) across various bank capital ratio requirements (in %) based on the model calibrations described in the text. The model follows Buchak *et al.* (2018b). The blue line is the mortgage origination by banks only, while the black line is the mortgage origination by banks and shadow banks together.

QE Monetary Policy

In another illustration, consider how unconventional monetary policy might impact risk inside the traditional banking system as well as overall lending in the economy. The Federal Reserve policy of buying mortgage-backed securities (MBS) under a quantitative easing program tends to push down mortgage interest rates for loans sold to GSEs, raising conforming lending volumes significantly. For example, if quantitative easing were to trim

MBS interest rates by 0.1 percentage point, this would impact both traditional banks and shadow banks (**Table 3**).

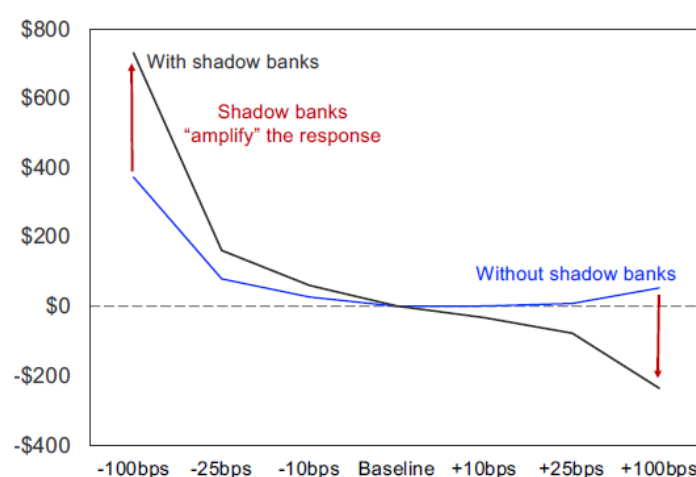
Table 3 Counterfactual analysis: change in lending in response to decrease in GSE financing cost by 10 bps

Lender	Loan Type	Financing Source	Change (US\$ Billion)
Total	-	-	+61
Bank	Jumbo	Balance Sheet	-4
Bank	Conforming	Balance Sheet	-357
Bank	Conforming	GSE	+389
Shadow Bank	Conforming	GSE	+33

Note: This table shows the change in mortgage origination volume (in US\$ billions) by banks and shadow banks when GSE financing cost decreases by 10 bps based on the model calibrations described in the text. The table further breaks down the mortgage volume change into jumbo and conforming loan volume change. Data are based on calculations in Buchak *et al.* (2018b).

Lower cost of selling leads to a significant increase in originate-to-distribute lending for traditional banks, as funding loans using balance sheets becomes less lucrative. Not surprisingly, for shadow banks that are reliant on selling to GSEs, a lower cost leads to a significant increase in their lending. However, because the GSEs do not buy jumbo loans, this market is left relatively unaffected. Thus, focusing only on banks, which operate significantly on the jumbo side as well, would understate the true impact of the policy, and miss the substantial policy effects on shadow banks. A more general aggregate lending volume change in response to changes in unconventional monetary policy of the form considered is illustrated in **Chart 4**. As can be seen, an integrated view that considers the behaviour of both banks and shadow banks side by side, reveals a quantitatively large *amplified* effect of the policy relative to one that only focuses on effects of the policy on traditional banks.

Chart 4 Counterfactual analysis: lending response to changes in GSE financing costs



Note: This figure shows aggregate mortgage origination volume (in US\$ billions) across various changes to the GSE financing costs relative to the baseline (in basis points) based on the model calibrations described in the text. The model follows Buchak *et al.* (2018b). The blue line is the mortgage origination by banks only, while the black line is the mortgage origination by banks and shadow banks together.

Overall, the two illustrations show that focusing only on the banks might result in amplified or dampened effects on outcome variables—such as aggregate risky lending in the economy—depending on the policy. In the context discussed above, focusing only on banks may overstate the true response to policies that impact funding of traditional banks directly. In contrast, focusing only on banks may understate the true response to policies that impact funding in the secondary market.

5 Conclusion

Intermediation in the lending market has undergone a dramatic shift from traditional banks to shadow banks, which are non-depository institutions that fall outside the scope of traditional banking regulation. I trace the growth of shadow banks to the increased regulatory burden faced by traditional banks and to the financial technology adopted by shadow banks. I argue that these factors explain changes in credit markets around the globe. Assessing financial stability in this new era involves understanding the business model of FinTech shadow banks and traditional banks, the industrial organisation of the credit market and the equilibrium interaction of intermediaries. I emphasise that a regulatory policy analysis requires the impact of policy on banks and shadow banks to be analysed side by side.

Importantly, while the detailed illustration focused on the US mortgage market, the lessons that emerge may be quite general. For instance, consider the case of shadow banks in China. A policy change, such as a monetary tightening, again demands an “integrated view of financial intermediation”. The presence of a large shadow banking sector is likely to play an important role as financial capital might flow to WMPs and internet finance products (see BIS Annual Report 2019, Chapter III; BIS, 2019). However, understanding the net effect of such a policy would require an equilibrium model of the kind I discussed since a large chunk of resources from Internet finance products are reinvested with banks.

I conclude with a few potentially important elements that have been missing from the discussion. In recent work (see Jiang, Matvos, Piskorski and Seru, 2020), we examine the sources of shadow bank funding. We find that their funding largely comes from short-term bank loans. Consequently, the risk in the traditional banking sector that is assessed just based on consumer credit that remains on bank balance sheet is incomplete for another reason. A more complete integrated view of the type I am advocating would need to consider the fact that banks might be, in large part, financing shadow banks.

In addition, while research has assessed the nature of risky lending extended by shadow banks and traditional banks, most of this work uses empirical data from a period of low default rates. Moreover, I have not discussed potentially interesting interactions between shadow banks and traditional banks based on changes in monetary policy following the work of Drechsler *et al.* (2019) and Xiao (2019). How changes in monetary policy or macroeconomic conditions might impact the nature of risky lending extended by shadow banks and traditional banks through various channels remains a fruitful area of investigation.

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Special Feature C

Privacy, Trust in Banks, and Use of Cash

Ivan Png and Charmaine Tan¹

1 Introduction

In China, street vendors, buskers, and even beggars accept electronic payments (Jenkins, 2018). By contrast, six of ten Tokyo restaurants require payment in cash (Lewis, 2019). Worldwide, the share of retail transactions paid in cash ranges from 11% in Norway (Norges Bank, 2018) to 74% in Germany (Deutsche Bundesbank, 2018).

Cash is costly, and estimated to cost an average of 1.5% of GDP worldwide (Jenkins, 2018), but just 0.5% of GDP in Singapore (Menon, 2016). Moreover, cash facilitates tax evasion, financial crimes, drug smuggling, and terrorism (Rogoff, 2015; Sands *et al.*, 2016). National governments would dearly like to reduce the use of cash. Yet, cash persists.

What accounts for the persistence of cash? Among consumers, not all subscribe to debit or credit cards, or mobile payments (Bagnall *et al.*, 2016; Esselink and Hernandez, 2017). One reason is they may (rationally) worry about spending excessively and rely on payment in cash as a mechanism to control themselves (Bertaut *et al.*, 2009; Von Kalckreuth *et al.*, 2014). Another is that paying with cash is a habit that is slow to change, especially for some segments of the population (Connolly and Stavins, 2015). Among merchants, not all wish to incur the fees associated with electronic payment systems (Boon, 2017). However, some of the costs of cash payments increase with transaction size relatively faster than the costs of electronic payments. Consequently, payment in cash is more frequent for transactions of smaller value (Whitesell, 1989; Chen *et al.*, 2019). Another factor affecting the reliability of electronic payments is infrastructure reliability. In June 2018, one of Visa's data centres broke down and disrupted 5.2 million transactions across Europe for a 10-hour period (Collinson, 2018).

In this study, we carry out an empirical investigation of two psychological factors that affect the use of cash which have been relatively overlooked in prior research. One is privacy. Payments in cash leave little paper trail. Indeed, the Privacy Commissioner of Canada (2018) advised cannabis buyers to pay in cash to avoid detection by governments of other countries. From a theoretical viewpoint, Kahn *et al.* (2005) argue that cash increases social welfare by enabling transactions that might not otherwise take place owing to the risk of sellers misusing buyers' identities.

The other factor is trust in banks. Data on electronic transactions is vulnerable to hacking and theft. Further, custodians of data may use or sell the data for other purposes. Hence, another factor in the use of cash is confidence in financial intermediaries, which is due in part to an underlying concern for privacy. Ms Sarah Friar, Chief Financial Officer of payments

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processor Square, has asserted: “We are very careful about what we share...One wrong step and we’d be out of business” (Jenkins, 2018). In addition, consumers are more likely to adopt electronic payment methods when there is a lower risk of bank default. Prior research has found that trust in banks affects depositor behaviour (Osili and Paulson, 2014) and cash holdings (Jobst and Stix, 2017).

Our study combines data from various sources. Data on the use of cash in retail transactions among 36 countries between 2010 and 2017 was constructed from central bank reports and other secondary sources. Data on concern for privacy and trust in banks was derived from the World Values Survey and the World Economic Forum.

In cross-sectional regression estimates, the use of cash in retail transactions increased with concern for privacy and decreased with trust in banks. Specifically, an increase in concern for privacy by one standard deviation (equivalent to an increase from the level in France to that in Korea) is associated with an increase in cash usage of 9.8% points. Further, an increase in trust in banks by one standard deviation (equivalent to an increase from the level in the United States to that in Finland) is associated with a reduction in cash usage of 12.3% points. These estimates are substantial relative to the mean of 70.2%.

Overall, our empirical results are consistent with concern for privacy and mistrust of financial institutions leading individuals to avoid electronic payments in favour of cash. These findings help to explain the persistence in the use of cash particularly in countries where people are concerned about privacy or lack confidence in financial institutions.

2 Data

We compiled a dataset of 36 countries from three main sources. Data on the proportion of the number of retail transactions paid in cash was drawn from central bank reports and other sources.² The central bank studies disclose their methodologies, which are mostly based on payment diaries kept by representative samples of consumers. By contrast, most other sources did not disclose their methodology or primary sources, and so, seem less reliable. Accordingly, wherever available, central bank data was preferred. **Table 1** reports the retail cash usage by country.

We drew measures of concern about privacy and trust in banks from the 2010–14 wave of the World Values Survey (Inglehart *et al.*, 2014) and the World Economic Forum’s Global Shapers Annual Survey 2017 (World Economic Forum, 2018). The World Values Survey is a nationally representative study of changes in the beliefs, values and motivations of people throughout the world. The Global Shapers Survey focuses on young people, aged between 18 and 35, and seeks to understand their perceptions of global issues and trends. If both sources were available, we preferred the Global Shapers Survey as it covered more countries. Data from the Global Shapers Survey for countries with fewer than 20 respondents was excluded. To make data from the two surveys comparable, the raw survey measures were standardised to zero mean and unit standard deviation.

² Data on the proportion of the total value of retail transactions paid by cash was available for only a subset of countries in the sample. Cash share by the number of transactions is generally higher than cash share by transaction value, since cash is used more frequently for small-value transactions.

Table 1 Cash usage

Country	Year	Average Cash Share of Retail Transactions (%)	Source	Central Bank
Austria	2016	81.8	Rusu and Stix (2017)	Oesterreichische Nationalbank
Australia	2016	37	Doyle <i>et al.</i> (2017)	Reserve Bank of Australia
Belgium	2016	63	Esselink and Hernandez (2017)	European Central Bank
Brazil	2011	89	Denecker <i>et al.</i> (2013)	-
Switzerland	2017	70	Swiss National Bank (2017)	Swiss National Bank
China	2010	98	McKinsey Global Payments Map	-
Cyprus	2016	88	Esselink and Hernandez (2017)	European Central Bank
Germany	2016–17	75.1	Deutsche Bundesbank (2018)	Deutsche Bundesbank
Estonia	2011–13	37	Kantar Emor, Turu-uuringute AS	-
Spain	2016	87	Esselink and Hernandez (2017)	European Central Bank
Finland	2016	54	Esselink and Hernandez (2017)	European Central Bank
France	2016	68	Esselink and Hernandez (2017)	European Central Bank
Greece	2016	88	Esselink and Hernandez (2017)	European Central Bank
Hong Kong SAR	2010	55.1	McKinsey Global Payments Map	-
Ireland	2016	79	Esselink and Hernandez (2017)	European Central Bank
India	2010	99.7	McKinsey Global Payments Map	-
Italy	2016	86	Esselink and Hernandez (2017)	European Central Bank
Japan	2010	77	Vinayak <i>et al.</i> (2012)	-
Korea	2010–14	51.9	Bank of Korea Payments Report (2014); Vinayak <i>et al.</i> (2012)	Bank of Korea -
Luxembourg	2016	64	Esselink and Hernandez (2017)	European Central Bank
Mexico	2011	96	Denecker <i>et al.</i> (2013)	-
Malaysia	2010	92.5	McKinsey Global Payments Map	-
Nigeria	2011	~100	Denecker <i>et al.</i> (2013)	-
Netherlands	2016	45	Esselink and Hernandez (2017)	European Central Bank
Norway	2017	11.9	Norges Bank (2018)	Norges Bank
Poland	2016	63	Narodowy Bank Polski (2018)	Narodowy Bank Polski

Portugal	2016	81	Esselink and Hernandez (2017)	European Central Bank
Russia	2011	95	Denecker <i>et al.</i> (2013)	-
South Africa	2011	92	Denecker <i>et al.</i> (2013)	-
Sweden	2016–17	14	Sveriges Riksbank (2018)	Sveriges Riksbank
Singapore	2015	60	KPMG (2016)	-
Thailand	2010	97.1	McKinsey Global Payments Map	-
Tunisia	2011	99	Denecker <i>et al.</i> (2013)	-
Taiwan	2010–13	70.9	Ministry of Economic Affairs, R.O.C.; McKinsey Global Payments Map	Ministry of Economic Affairs, R.O.C.
United Kingdom	2017	34	UK Finance (2018)	-
United States	2016	27.1	Greene and Stavin (2018)	Federal Reserve Bank of Boston

Table 2 reports summary statistics of the combined dataset. For 21 countries, data on privacy and trust in banks from the Global Shapers Survey was merged with data on average cash usage in 2016–17. For the other 15 countries, we drew on the World Values Survey, and merged the data with that on average cash usage in 2010–14. On average across the countries in our sample, 70.2% of retail transactions were paid in cash.³ The means of the measures of privacy concern and trust in banks are naturally close to zero owing to standardisation. Evidently, across countries, there was considerable variation in usage of cash, privacy concern, and trust in banks. Data on GDP per capita and on Internet users was drawn from the World Development Indicators. Internet users is the number of people (per 100) who had used the Internet in the previous three months via a computer, mobile phone, personal digital assistant, games machine, digital TV etc.

Table 2 Summary statistics

Variables	Unit	Observations	Mean	Standard Deviation	Min	Max
Cash usage	Per cent	36	70.2	25.0	11.9	100
GDP per capita	US\$ (Thousand)	36	33.8	24.6	1.35	101
Internet users	% of population	35	68.8	24.9	7.5	98.1
Global Shapers Survey dummy		36	0.583	0.500	0	1
Privacy concern		36	0.178	0.964	-1.64	2.28
Trust in banks		36	0.170	0.937	-1.12	2.50

³ Among the 21 countries matched with the Global Shapers Survey, the average share of retail transactions paid in cash was 60.9% in 2016–17. For the other 15 countries, average cash usage in 2010–14 was 83.3%.

3 Results

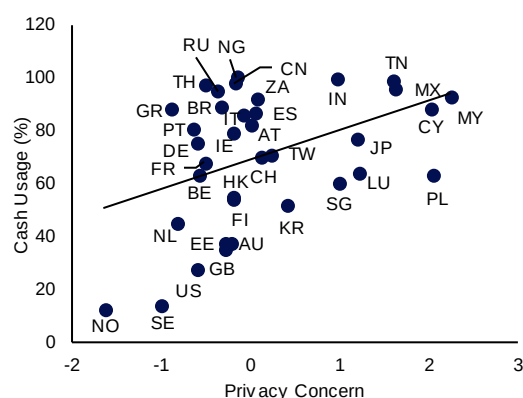
For a preliminary look at the data, **Chart 1a** graphs the cash share of retail transactions against concern for privacy. The upward-sloping regression line suggests that use of cash increased with concern for privacy. Further, **Chart 1b** graphs the cash share of retail transactions against confidence in banks. The downward-sloping regression line suggests that use of cash decreased with confidence in banks.

While suggestive, **Charts 1a** and **1b** do not take account of other factors that might possibly affect the relationship between usage of cash and concern for privacy and trust in banks. Accordingly, we turn to multiple regression analyses.

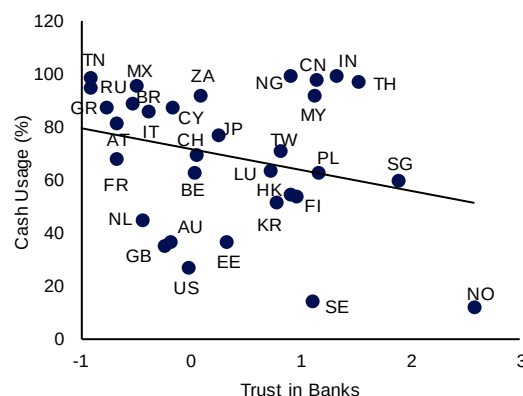
Table 3 reports ordinary least squares regression estimates of the cash share of retail transactions, with robust standard errors in parentheses. Column (1) reports an estimate of a baseline specification with GDP per capita as the only explanatory variable. The coefficient of GDP per capita is negative and significant. This result is consistent with cash usage decreasing with subscription to debit and credit cards, smartphones and payment infrastructure, all of which increase with income.

Chart 1 Cash, privacy, and trust in banks

a. Privacy concern



b. Trust in banks



Note: Privacy concern from the Global Shapers Survey is based on the proportion of respondents who chose privacy as one of the “most serious issues facing the world today”. Privacy concern from the World Values Survey is measured by the responses to the question “To what degree are you worried about government wire-tapping or reading my mail or email?” Trust in banks from the Global Shapers Survey is based on the proportion of respondents who agree that they trust banks to be fair and honest. Trust in banks from the World Values Survey is measured by the responses to the question “How much confidence do you have in banks?”

Table 3 Regression estimates of the cash share of retail transactions

Dependent Variable: Cash Share of Retail Transactions	Specification					
	Baseline	Privacy Concern	Trust in Banks	Privacy and Trust in Banks	Internet Users	Central Bank Studies
	(1)	(2)	(3)	(4)	(5)	(6)
GDP per capita	-0.553*** (0.174)	-0.387** (0.183)	-0.364** (0.169)	-0.308** (0.151)	0.139 (0.097)	0.308** (0.142)
Privacy concern		7.184** (3.498)		7.852*** (2.890)	8.542*** (2.110)	9.829*** (2.417)
Global Shapers Survey dummy		-7.592 (9.437)	-15.684** (7.002)	-13.490* (7.175)	7.435 (5.116)	10.641** (5.009)
Trust in banks			-9.658*** (2.959)	-10.153*** (2.791)	-10.413*** (1.959)	-12.283*** (2.672)
Internet users					-0.922*** (0.133)	-1.498*** (0.401)
Observations	36	36	36	36	35	22
R ²	0.30	0.39	0.45	0.53	0.78	0.77

Note: Robust standard errors in parentheses.

* Statistically significant at the 5% level

** Statistically significant at the 1% level

*** Statistically significant at the 0.1% level

Column (2) includes concern for privacy and an indicator of the Global Shapers Survey as additional explanatory variables. The coefficient of concern for privacy is positive and significant. This is consistent with individuals being more likely to pay in cash for retail purchases in countries where people are more concerned about privacy. The Global Shapers Survey dummy variable controls for differences between the two sources of data on privacy and trust in banks, as well as differences in the period of study associated with the two sources. The indicator is not significant, suggesting that there was no significant difference between the two sources.

Column (3) includes trust in banks and the Global Shapers Survey indicator. The coefficient of trust in banks is negative and significant. This is consistent with individuals being more likely to use cash in paying for retail purchases in countries where people have less trust in banks. The coefficient of the Global Shapers Survey indicator is negative and significant, suggesting that cash usage was lower in countries covered by the Global Shapers Survey. Yet, this negative coefficient should be interpreted with caution as it changes sign and becomes positive in the final specification.

Column (4) reports the estimates from a specification including both concern for privacy and confidence in banks. The coefficients on both variables are significant and similar in magnitude to the estimates obtained when each of these explanatory variables was included individually. This suggests that cash usage is higher when there is lower trust in banks for other reasons besides privacy concern, such as concerns over banking system stability.

Column (5) accounts for the technological sophistication in the country by including the proportion of Internet users. The coefficient of Internet users is negative and significant. This is consistent with the hypothesis that cash usage decreases with the level of sophistication in information and communications technologies, which in turn is likely to be correlated with the adoption of other payment innovations, such as mobile payment modes. After controlling for technological sophistication, the coefficients of GDP per capita and the Global Shapers Survey indicator are not statistically significant.

Finally, column (6) reports an estimate of the full specification limited to the observations of cash usage reported by central banks, which are more reliable relative to those from secondary sources. The coefficients of concern for privacy and confidence in banks are significant and greater in magnitude than the estimates including the entire sample. The coefficients of GDP per capita and the Global Shapers Survey indicator have the opposite signs compared to column (4), so they are to be interpreted with caution. After accounting for differences in technological sophistication, cash usage is higher in countries with higher GDP per capita and in those covered by the Global Shapers Survey.

In this specification, the estimated coefficient of concern for privacy implies that an increase in concern by one standard deviation (equivalent to an increase from the level in France to that in Korea) would be associated with an increase in cash usage by 9.8% points. Further, the estimated coefficient of trust in banks implies that an increase in trust by one standard deviation (equivalent to an increase from the level in the United States to that in Finland) would be associated with a reduction in cash usage by 12.3% points. These counterfactual estimates are substantial relative to the mean of 70.2%.

4 Discussion

Empirically, our cross-country analysis shows that the use of cash to pay for retail purchases increased with concern for privacy and decreased with confidence in banks. In contrast with factors such as fees for electronic payments and reliability of infrastructure, concern for privacy and trust in banks are psychological factors which cannot be easily influenced through economic policies. Our findings may help to explain the continuing persistent use of cash in retail payments, particularly in societies such as Japan where people are very concerned about privacy and Spain where people lack confidence in banks. Further, our findings suggest that government policy to promote electronic payments may have to address fundamental concerns about privacy and confidence in financial institutions. Country-specific experiences may weigh on policy decisions, especially where individuals have been aggrieved by large-scale data breaches, systemic banking crises or financial scandals.

Our analysis is subject to several limitations. First, the available data on concern for privacy and trust in banks in the Global Shapers Survey and World Values Survey is limited to a single observation per country. This constrained our study to a cross-sectional analysis. Second, data on usage of cash for about one-third of the countries was only available from secondary sources other than central banks, which are possibly less reliable. Nevertheless, our findings are robust to excluding these countries. Finally, we were unable to explicitly control for some potentially confounding factors such as the availability of electronic payment methods, the prevalence of retail spending, and the costs of holding cash.

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Statistical Appendix

Gross Domestic Product

Table 1	Real GDP Growth by Sector
Table 2	Real GDP Growth by Expenditure Components

Labour Market

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Consumer Price Index and Inflation

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Government Finance

Table 15	Government Operating Revenues, Expenditures and Transfers
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Table 1: Real GDP Growth by Sector

	2018	2019	2018				2019				2020
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1*
Year-on-year Percentage Change											
Overall Economy	3.4	0.7	4.8	4.9	3.0	1.1	1.0	0.2	0.7	1.0	-2.2
Manufacturing	7.0	-1.4	10.0	10.6	3.5	4.6	0.0	-2.7	-0.7	-2.3	-0.5
Finance & Insurance	7.2	4.1	11.5	7.9	5.5	4.3	3.1	5.1	4.1	4.0	
Business Services	2.4	1.4	3.9	2.4	2.4	0.9	1.8	1.0	1.1	1.7	
Construction	-3.5	2.8	-3.4	-4.0	-3.3	-3.4	1.4	2.3	3.1	4.3	-4.3
Wholesale & Retail Trade	2.8	-2.9	2.8	5.3	4.6	-1.1	-2.7	-3.6	-3.5	-1.9	
Accommodation & Food Services	3.1	1.9	0.9	3.8	3.8	3.7	2.0	1.2	1.9	2.5	
Transportation & Storage	0.0	0.8	1.3	-0.2	0.0	-1.2	0.4	2.1	0.0	0.8	
Information & Communications	6.5	4.3	4.2	5.9	6.9	9.1	4.9	3.4	4.4	4.5	
Quarter-on-quarter Percentage Change (Seasonally Adjusted, Annualised)											
Overall Economy			3.3	2.1	0.8	-1.3	2.3	-0.8	2.2	0.6	-10.6
Manufacturing			15.0	8.1	-2.9	-0.4	-3.6	-4.1	4.8	-5.9	4.2
Finance & Insurance			5.7	5.1	1.9	4.5	0.8	13.8	-1.9	3.8	
Business Services			3.2	1.2	0.7	-0.4	5.2	-1.2	1.2	2.2	
Construction			-11.1	-6.6	0.9	2.5	7.9	-0.3	3.5	5.3	-22.9
Wholesale & Retail Trade			4.5	1.9	-2.4	-7.4	-3.0	-2.0	-1.3	-0.6	
Accommodation & Food Services			4.1	6.3	2.2	2.2	-2.3	2.8	5.1	4.3	
Transportation & Storage			-5.7	-3.2	5.1	-1.0	1.2	3.0	-3.1	2.0	
Information & Communications			6.1	8.4	9.4	9.3	-5.3	2.8	10.8	8.9	

* Advance Estimates

Source: Singapore Department of Statistics

Table 2: Real GDP Growth by Expenditure Components

	2018	2019	2018				2019			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Year-on-year Percentage Change										
Total Demand	6.3	-0.7	8.2	9.0	6.3	2.0	-0.6	-1.3	-2.1	1.1
Domestic Demand	1.9	1.3	3.4	2.7	2.7	-0.8	3.6	1.0	1.1	-0.2
Consumption	3.9	3.5	4.7	4.0	3.8	3.3	4.9	2.7	3.5	3.0
Private	4.2	3.7	3.9	4.8	4.7	3.5	5.4	3.2	3.8	2.6
Public	2.9	2.8	6.9	1.1	0.7	2.4	3.4	0.7	2.6	4.3
Gross Fixed Capital Formation	-3.4	-0.2	0.0	-1.4	-4.7	-7.2	-0.6	-0.7	2.5	-1.7
Private	-3.1	-0.5	2.7	-0.9	-6.2	-7.2	-0.3	-1.7	3.3	-3.0
Public	-4.7	1.3	-7.7	-4.5	2.0	-7.4	-1.7	4.1	-0.9	4.5
Exports of Goods and Services	8.1	-1.6	10.3	11.6	7.7	3.2	-2.2	-2.2	-3.4	1.6
Imports of Goods and Services	7.3	-1.7	10.3	10.3	6.4	2.6	-2.4	-2.5	-3.3	1.4

Source: Singapore Department of Statistics

Table 3: Wages, Value Added Per Worker and Unit Labour Cost

	2018	2019	2018				2019			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Year-on-year Percentage Change										
Average Monthly Earnings	3.5	2.6	4.0	3.6	3.5	2.8	3.4	2.1	4.5	0.5
Value Added Per Worker										
Overall Economy ¹	2.7	-0.8	4.7	4.4	2.1	-0.1	-0.4	-1.2	-0.9	-0.6
Manufacturing	8.3	-0.9	12.5	12.6	4.0	4.9	0.2	-2.4	0.2	-1.6
Construction	0.9	2.1	3.7	1.1	0.1	-1.6	2.4	2.1	1.9	2.0
Wholesale & Retail Trade	2.6	-2.6	2.8	5.1	4.3	-1.4	-2.8	-3.7	-3.0	-0.9
Accommodation & Food Services	2.2	-1.1	-0.3	3.0	3.3	3.1	-0.1	-1.8	-1.6	-0.7
Transportation & Storage	-3.3	-0.9	-1.7	-3.6	-3.5	-4.3	-2.3	0.2	-1.2	-0.2
Information & Communications	1.7	-1.3	0.8	1.8	1.5	2.7	-1.2	-2.5	-1.0	-0.5
Finance & Insurance	4.7	1.3	9.3	5.7	3.2	1.2	-0.1	2.1	1.7	1.6
Business Services	0.1	-0.9	1.5	0.0	0.3	-1.2	-0.2	-0.9	-1.6	-1.0
Unit Labour Cost										
Overall Economy	0.3	2.8	-0.7	-0.8	0.7	1.8	2.5	3.3	3.6	2.1
Goods-producing Industries	-4.0	2.2	-5.4	-7.4	-2.0	-1.3	0.4	4.1	2.3	2.6
Manufacturing	-4.1	3.3	-5.3	-8.3	-1.7	-1.2	1.6	5.6	3.4	3.0
Services-producing Industries	1.5	3.0	0.6	1.1	1.5	3.0	3.2	3.0	3.9	1.8

Source: Central Provident Fund, Singapore Department of Statistics and Ministry of Manpower

¹ Based on GDP at market prices in chained 2015 dollars. Value added per worker for sectors is computed using gross value added at basic prices in chained 2015 dollars.**Table 4: Employment by Sector**

	2018	2019	2018				2019			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Year-on-year Change in Employment (Thousand)										
Overall Economy (SSIC 2015 Sectors)	45.3	65.0	3.7	6.5	19.3	15.9	13.4	5.5	26.0	20.1
Manufacturing	-2.4	-2.4	-3.8	-0.1	3.5	-2.0	-3.1	-1.5	1.0	1.3
Construction	-7.1	12.5	-5.7	-0.7	-0.3	-0.4	0.1	2.7	5.4	4.2
Wholesale & Retail Trade	1.6	-4.9	-1.8	-1.7	1.1	4.1	-1.9	-3.0	-1.9	1.9
Accommodation & Food Services	1.3	5.1	-1.1	-1.6	1.0	3.0	0.3	0.4	1.7	2.7
Transportation & Storage	7.7	2.9	2.0	2.6	1.7	1.4	1.1	0.2	0.0	1.6
Information & Communications	8.4	7.1	1.2	2.4	3.1	1.6	1.4	2.0	2.5	1.2
Finance & Insurance	7.6	6.2	2.2	1.7	2.5	1.1	2.0	1.6	1.5	1.2
Business Services	10.5	17.7	3.2	1.8	1.9	3.8	5.1	2.4	7.1	3.1
Other Services	17.8	21.0	7.4	2.1	5.1	3.2	8.5	1.2	8.5	2.8
Others	-0.1	-0.1	0.1	0.0	-0.3	0.1	0.1	-0.4	0.1	0.1

Source: Ministry of Manpower

Table 5: Imports and Exports by Category

	2018	2019	2018				2019				2020
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
Year-on-year Percentage Change											
Total Trade (At Current Prices)	9.2	-3.2	2.5	10.2	14.7	9.2	2.1	-2.2	-6.7	-5.3	0.6
Exports	7.9	-4.2	2.3	9.3	12.7	7.2	0.0	-4.6	-7.3	-4.3	-1.3
Domestic Exports	8.4	-10.5	3.5	12.9	14.5	3.4	-6.5	-10.6	-13.1	-11.5	-6.2
Oil	17.1	-12.9	8.6	20.4	28.9	12.1	-6.5	-2.9	-19.7	-21.5	-28.9
Non-oil	4.2	-9.2	1.1	9.3	8.0	-1.1	-6.4	-14.7	-9.6	-5.7	5.8
Electronics	-5.5	-22.5	-7.9	-7.8	-3.0	-3.6	-17.4	-27.0	-25.0	-20.4	-2.3
Non-electronics	8.2	-4.5	4.6	16.5	12.6	-0.2	-2.6	-10.6	-3.9	-0.3	8.1
Re-exports	7.4	2.3	0.9	5.7	11.1	11.2	6.8	2.0	-1.7	2.8	3.2
Imports	10.6	-2.1	2.8	11.1	17.0	11.5	4.5	0.5	-5.9	-6.3	2.7
Total Trade (At 2018 Prices)	4.7	-2.1	3.6	5.7	5.7	3.7	-0.9	-3.0	-3.9	-0.7	3.8
Exports	4.2	-3.0	3.7	5.7	5.2	2.5	-2.4	-5.0	-4.9	0.4	1.0
Domestic Exports	1.0	-7.3	2.9	3.9	1.2	-3.7	-7.8	-9.2	-8.3	-3.9	-1.4
Oil	-4.7	-5.6	-0.5	-7.5	-6.1	-4.5	-8.3	1.4	-9.2	-6.6	-16.6
Non-oil	4.4	-8.2	5.1	10.9	5.3	-3.2	-7.5	-14.7	-7.8	-2.4	7.4
Re-exports	7.8	1.5	4.5	7.7	9.2	9.3	3.5	-0.5	-1.7	4.6	3.4
Imports	5.2	-1.2	3.5	5.7	6.4	5.1	0.7	-0.8	-2.7	-1.9	6.7

Source: Enterprise Singapore

Table 6: Non-oil Domestic Exports by Destination

	2018	2019	2018				2019				2020
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
Year-on-year Percentage Change											
All countries	4.2	-9.2	1.1	9.3	8.0	-1.1	-6.4	-14.7	-9.6	-5.7	5.8
ASEAN	4.5	-10.0	0.9	6.3	17.8	-6.5	-4.5	-15.1	-18.2	-0.4	4.8
Indonesia	11.3	-12.3	11.1	14.1	28.1	-5.8	-14.2	-12.0	-14.9	-7.6	-7.6
Malaysia	-0.9	-10.3	1.9	-5.4	6.1	-6.1	-3.8	-15.5	-18.4	-2.6	-9.3
Thailand	-1.3	-4.3	-9.6	-1.0	6.9	-2.2	1.2	-11.4	-9.9	4.5	46.9
NEA-3	-7.6	-14.3	-4.9	-8.2	-9.9	-7.3	-12.7	-21.3	-15.8	-7.3	6.2
Hong Kong	-3.9	-16.6	-7.4	4.3	-12.3	1.4	-1.3	-18.7	-22.9	-21.7	-15.9
Korea	-17.6	-14.5	8.9	-23.2	-26.9	-24.0	-31.5	-18.4	-6.0	1.1	36.7
Taiwan	-4.5	-11.3	-10.8	-9.7	8.2	-3.9	-11.7	-26.5	-12.5	5.7	17.4
China	-8.8	-1.0	-11.5	-0.1	-13.3	-10.7	-2.2	-14.7	17.1	-0.6	-10.5
EU	7.6	-11.5	0.4	18.2	18.3	-2.3	-9.1	-3.6	-22.6	-10.8	15.1
Japan	11.4	-28.6	20.6	8.0	16.2	1.4	-29.5	-29.2	-32.6	-22.4	29.3
United States	38.2	1.3	45.8	41.1	34.6	32.2	8.3	1.0	-5.0	1.4	23.1

Source: Enterprise Singapore

Table 7: Consumer Price Index by Expenditure Category and MAS Core Inflation Measure

	2018	2019	2018				2019				2020
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
Year-on-year Percentage Change											
CPI-All Items	0.4	0.6	0.2	0.3	0.7	0.5	0.5	0.8	0.4	0.6	0.4
Food	1.4	1.5	1.3	1.4	1.6	1.4	1.6	1.5	1.4	1.6	1.6
Clothing & Footwear	1.4	-0.8	1.0	1.0	2.3	1.6	1.8	-0.8	-2.5	-1.6	-3.1
Housing & Utilities	-1.3	-1.0	-2.6	-2.0	-0.7	0.0	-0.6	-0.8	-1.3	-1.3	-0.2
Household Durables & Services	0.8	0.8	0.9	0.8	0.7	0.8	0.8	1.3	0.6	0.4	0.4
Health Care	2.0	1.1	2.3	2.2	2.0	1.7	1.9	1.3	1.1	0.2	-1.5
Transport	-0.5	0.8	0.3	-0.1	-0.2	-2.0	-1.3	1.4	0.8	2.3	2.0
Communication	-1.0	-0.9	-0.1	-0.7	-1.0	-2.3	-1.5	-1.1	-1.4	0.3	0.5
Recreation & Culture	1.2	1.1	1.0	1.1	1.5	1.2	1.4	1.8	0.6	0.5	-1.0
Education	2.9	2.4	2.9	2.9	2.6	3.2	2.8	2.5	2.2	2.1	-0.6
Miscellaneous Goods & Services	1.0	0.4	0.6	0.9	1.1	1.3	0.8	0.2	0.2	0.3	-0.1
MAS Core Inflation Measure¹	1.7	1.0	1.5	1.5	1.9	1.8	1.8	1.3	0.6	0.5	0.0

Source: Singapore Department of Statistics and Monetary Authority of Singapore

¹ The MAS Core Inflation measure is the CPI-All Items excluding the accommodation and private transport expenditure categories.**Table 8: Current Account**

	2018	2019	2018				2019			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
S\$ Billion										
Current Account Balance	86.5	86.1	18.1	22.5	25.8	20.2	17.7	24.6	24.2	19.6
Goods Account Balance	140.3	133.7	30.8	34.7	37.6	37.1	31.1	36.9	33.8	31.9
Exports	621.1	601.3	144.0	156.8	161.2	159.2	143.7	154.3	150.0	153.3
Imports	480.9	467.6	113.2	122.0	123.5	122.1	112.7	117.4	116.2	121.4
Services Account Balance	2.8	7.9	1.3	1.5	1.5	-1.4	1.7	1.5	3.3	1.3
Manufacturing Services	-7.0	-6.9	-1.7	-1.7	-1.8	-1.8	-1.6	-1.7	-1.8	-1.8
Maintenance & Repairs	8.7	10.0	2.4	2.1	2.0	2.2	2.2	2.5	2.5	2.7
Transport	-2.8	-3.7	-0.6	-0.8	-0.6	-0.8	-1.0	-1.4	-0.5	-0.7
Travel	-7.9	-8.9	-1.3	-2.0	-1.5	-3.0	-1.8	-2.4	-1.7	-3.0
Financial	29.6	29.7	7.5	7.6	7.7	6.9	7.3	7.5	7.7	7.3
Intellectual Property	-11.4	-10.5	-2.9	-2.4	-3.0	-3.1	-2.3	-2.8	-2.8	-2.7
Primary Income Balance	-48.3	-46.8	-12.2	-11.7	-11.1	-13.3	-13.2	-11.4	-10.7	-11.6
Secondary Income Balance	-8.3	-8.6	-1.8	-2.0	-2.3	-2.2	-1.9	-2.4	-2.2	-2.0
Current Account Balance (% of GDP)	17.2	17.0	15.0	18.2	20.2	15.3	14.1	19.7	18.9	15.2

Source: Singapore Department of Statistics

Table 9: Capital and Financial Accounts

	2018	2019	2018				2019			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
S\$ Billion										
Capital and Financial Account Balance	66.2	95.0	10.4	14.5	18.3	23.1	5.0	55.8	19.1	15.1
Direct Investment	-82.6	-98.5	-20.2	-21.4	-24.3	-16.7	-22.5	-24.6	-25.7	-25.7
Portfolio Investment	48.2	137.8	18.8	11.9	-6.3	23.7	4.9	82.3	23.7	26.9
Financial Derivatives	26.1	14.1	4.3	5.8	7.9	8.1	-0.1	2.7	6.2	5.3
Other Investment	74.7	41.6	7.4	18.2	41.1	8.1	22.8	-4.6	14.8	8.6
Net Errors and Omissions	-3.3	-2.6	-0.9	-0.2	-1.2	-1.0	0.2	-0.9	-0.9	-1.0
Overall Balance	16.9	-11.4	6.8	7.8	6.2	-3.9	12.9	-32.0	4.1	3.5
Official Foreign Reserves (End of Period)	392.1	375.8	376.5	392.8	398.1	392.1	400.7	370.6	376.5	375.8

Source: Singapore Department of Statistics and Monetary Authority of Singapore

Table 10: Bilateral Exchange Rates

	2018	2019	2018				2019				2020
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
Singapore Dollar per Foreign Currency Unit (End of Period)											
US Dollar	1.3648	1.3472	1.3117	1.3650	1.3671	1.3648	1.3559	1.3535	1.3813	1.3472	1.4247
Pound Sterling	1.7318	1.7686	1.8470	1.7902	1.7879	1.7318	1.7714	1.7152	1.6971	1.7686	1.7583
Euro	1.5618	1.5094	1.6169	1.5885	1.5923	1.5618	1.5223	1.5383	1.5101	1.5094	1.5710
100 Swiss Franc	138.60	139.20	137.18	137.23	139.97	138.60	136.15	138.67	139.33	139.20	148.40
100 Japanese Yen	1.2359	1.2398	1.2308	1.2332	1.2044	1.2359	1.2245	1.2576	1.2796	1.2398	1.3142
Malaysian Ringgit	0.3298	0.3292	0.3391	0.3380	0.3302	0.3298	0.3322	0.3268	0.3299	0.3292	0.3311
Hong Kong Dollar	0.1743	0.1731	0.1671	0.1739	0.1747	0.1743	0.1727	0.1733	0.1762	0.1731	0.1837
100 New Taiwan Dollar	4.4655	4.4912	4.5004	4.4743	4.4843	4.4655	4.3991	4.3671	4.4511	4.4912	4.7085
100 Korean Won	0.1227	0.1166	0.1230	0.1222	0.1233	0.1227	0.1193	0.1170	0.1152	0.1166	0.1166
Australian Dollar	0.9636	0.9434	1.0041	1.0078	0.9864	0.9636	0.9607	0.9487	0.9334	0.9434	0.8794

Source: Monetary Authority of Singapore

Table 11: Singapore Nominal Effective Exchange Rate (S\$ NEER)

Period	Index (1–5 Apr 2019 Average=100)											
	2019						2020					
	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Average for week												
1	100.00	100.01	99.93	100.25	99.69	99.63	100.00	100.53	100.50	100.68	99.24	98.81
2	100.02	100.05	100.01	100.22	99.51	99.90	100.06	100.58	100.64	100.67	98.77	98.29
3	100.06	99.93	100.11	100.09	99.21	100.07	100.45	100.60	100.61	100.69	98.69	97.93
4	100.03	99.63	100.26	99.85	99.49	100.09	100.58	100.62	100.66	100.70	98.84	98.06
5		99.55			99.51			100.49		100.25		

Source: Monetary Authority of Singapore

Table 12: Money Supply

	2018	2019	2018				2019			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
S\$ Billion (End of Period)										
M1	188.8	195.7	193.2	190.7	188.4	188.8	192.1	193.0	191.7	195.7
M2	602.7	632.5	588.6	588.6	597.7	602.7	617.2	620.3	626.4	632.5
M3	615.3	646.7	601.2	601.4	610.3	615.3	629.9	634.0	640.4	646.7
Reserve Money	71.8	73.9	70.6	70.2	69.7	71.8	72.9	71.0	73.8	73.9
Year-on-year Percentage Change										
M1	0.1	3.6	11.1	4.2	0.8	0.1	-0.6	1.2	1.8	3.6
M2	3.9	5.0	2.7	2.6	3.4	3.9	4.9	5.4	4.8	5.0
M3	3.9	5.1	2.8	2.7	3.4	3.9	4.8	5.4	4.9	5.1
Reserve Money	5.4	2.9	9.3	8.9	5.0	5.4	3.3	1.1	5.9	2.9

Source: Monetary Authority of Singapore

Table 13: Interest Rates

			2018				2019			
	2018	2019	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Per cent per annum (End of period)										
Prime Lending Rate	5.33	5.25	5.33	5.33	5.33	5.33	5.25	5.25	5.25	5.25
3-month Singapore Interbank Offered Rate (SIBOR)	1.89	1.77	1.45	1.52	1.64	1.89	1.94	2.00	1.88	1.77
3-month London Interbank Offered Rate (LIBOR)	2.81	1.91	2.31	2.34	2.40	2.81	2.60	2.32	2.09	1.91
Banks' Rates										
Savings Deposits	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
12-month Fixed Deposits	0.45	0.57	0.34	0.37	0.40	0.45	0.55	0.57	0.57	0.57

Source: ABS Benchmarks Administration Co Pte Ltd and ICE Benchmark Administration Ltd

Table 14: Domestic Liquidity Indicator (DLI)

Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Change from 3 Months Ago												
2012	0.139	0.599	0.695	0.637	0.329	0.114	0.280	0.462	0.707	0.383	0.306	0.139
2013	0.003	-0.088	-0.190	0.082	-0.053	-0.034	-0.075	0.094	0.416	0.443	0.551	0.003
2014	-0.054	-0.133	-0.246	0.143	0.136	0.363	0.194	0.095	0.038	0.002	-0.027	-0.054
2015	0.011	-0.069	-0.125	0.353	0.695	0.742	0.164	-0.203	-0.115	0.006	0.265	0.011
2016	-0.068	-0.002	0.182	0.419	0.172	0.226	0.291	0.279	-0.217	-0.500	-0.402	-0.068
2017	0.064	0.180	0.341	0.317	0.092	-0.089	0.070	0.166	0.190	0.009	0.103	0.064
2018	0.102	-0.148	0.044	0.135	0.277	0.043	0.068	0.242	0.258	0.211	0.189	0.102
2019	0.275	0.167	0.137	0.076	0.064	0.135	0.048	-0.151	-0.128	0.049	0.296	0.275
2020	0.008	-0.536	-0.822									

Source: Monetary Authority of Singapore

Note: The DLI is a measure of overall monetary conditions, reflecting changes in the S\$NEER and 3-month S\$ SIBOR rate. A positive (negative) number indicates a tightening (easing) monetary policy stance from the previous quarter. Please refer to the June 2001 issue of the MAS ED *Quarterly Bulletin* for more information.

Table 15: Government Operating Revenues, Expenditures and Transfers

	Fiscal Year 2017	Fiscal Year 2018	Fiscal Year 2019 (Revised)	Fiscal Year 2020 (Revised)
S\$ Billion				
Operating Revenue	75.8	73.7	74.7	70.4
Tax Revenue	66.4	66.2	67.9	
Income Tax	32.1	30.8	32.4	
Asset Taxes	4.4	4.6	4.7	
Stamp Duty	4.9	4.6	4.3	
Goods and Services Tax	11.0	11.1	11.2	
Non-tax Revenue	9.5	7.5	6.9	
Expenditure	73.6	77.8	78.2	89.8
Operating Expenditure	55.6	57.6	59.5	
Development Expenditure	18.0	20.3	18.6	
Primary Surplus (+) / Deficit (-)	2.3	-4.1	-3.4	-19.4
Less: Special Transfers	6.1	9.0	15.3	43.6
Add: Contribution from Net Investment Returns	14.7	16.4	17.0	18.6
Overall Budget Surplus (+) / Deficit (-)	10.9	3.3	-1.7	-44.3
Percentage of Nominal GDP				
Operating Revenue	15.9	14.5	14.7	14.1
Tax Revenue	13.9	13.0	13.3	
Income Tax	6.6	6.1	6.4	
Asset Taxes	0.9	0.9	0.9	
Stamp Duty	1.0	0.9	0.8	
Goods and Services Tax	2.3	2.2	2.2	
Non-tax Revenue	2.0	1.5	1.4	
Expenditure	15.4	15.3	15.4	18.0
Operating Expenditure	11.7	11.3	11.7	
Development Expenditure	3.8	4.0	3.7	
Primary Surplus (+) / Deficit (-)	0.5	-0.8	-0.7	-3.9
Less: Special Transfers	1.3	1.8	3.0	8.8
Add: Contribution from Net Investment Returns	3.1	3.2	3.3	3.7
Overall Budget Surplus (+) / Deficit (-)	2.3	0.7	-0.3	-8.9

Source: Ministry of Finance

Note: Fiscal Year 2020's estimates were revised following the Resilience and Solidarity Budgets. They currently do not take into account the extensions to the Solidarity Budget announced on 21 April 2020.