Monetary Authority of Singapore

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MACROECONOMIC REVIEW

Volume XX Issue 2
October 2021

Macroeconomic Review

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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

AE	Advanced economy
AER	arts, entertainment and recreation
AFC	Asian Financial Crisis
ASEAN	Association of Southeast Asian Nations
COE	Certificate of Entitlement
COVID-19	Coronavirus disease 2019
CPI	Consumer price index
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
GFC	Global Financial Crisis
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
NORX	Non-oil re-exports
OECD	Organisation for Economic Cooperation and Development
OPEC	Organization of the Petroleum Exporting Countries
p.a.	per annum
PMI	Purchasing Managers' Index
q-o-q	quarter-on-quarter
SA	seasonally adjusted
SME	Small and medium enterprises
UN	United Nations
VA	value added
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), Civil Aviation Authority of Singapore (CAAS), Central Provident Fund Board (CPF), Singapore Department of Statistics (DOS), Economic Development Board (EDB), Enterprise Singapore (ESG), Infocomm Media Development Authority (IMDA), Land Transport Authority (LTA), Ministry of Finance (MOF), Ministry of Health (MOH), Manpower Research and Statistics Department (MRSD) of 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*, we are pleased to present Special Feature A, which reviews Singapore's inflation experience through the economy's major cyclical phases since the establishment of MAS, identifying the historical drivers of inflation outcomes and key monetary policy considerations. We are grateful to Professor Ramkishen S. Rajan of the Lee Kuan Yew School of Public Policy for valuable guidance and comments on Special Feature A. We thank Professor Stephen G. Cecchetti from Brandeis International Business School and Professor Kermit L. Schoenholtz from New York University's Leonard N. Stern School of Business for contributing Special Feature B, which examines the principal outcomes of recent major monetary policy strategy reviews by the US Federal Reserve and European Central Bank. Our appreciation also goes to Tidiane Kinda from the IMF for contributing Box A, which presents an empirical analysis of the drivers of sector-level labour productivity growth in advanced economies, including Singapore. Adjunct Professor Choy Keen Meng of Singapore Management University edited parts of the Special Feature section of the *Review.*

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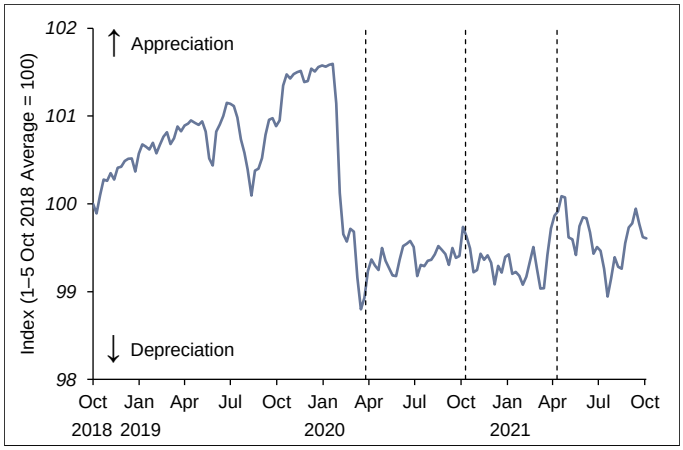
14 October 2021

Monetary Policy Statement

INTRODUCTION

1. In its April 2021 Monetary Policy Statement, MAS kept the rate of appreciation of the S$NEER policy band at zero percent, with no change to the width of the policy band or the level at which it was centred. This policy stance was appropriate as core inflation was projected to rise only gradually from subdued levels and keep below its historical average.

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



------ indicates last three releases of Monetary Policy Statement

2. Over the last six months, the S$NEER broadly fluctuated within the upper half of the policy band, reflecting in part shifting sentiments around Singapore's macroeconomic outlook as the pandemic evolved. On a point-to-point basis, the trade-weighted index weakened as the S$ depreciated against some of the regional currencies and the US$. The three-month S$ Singapore Interbank Offered Rate (SIBOR) was unchanged at 0.4%, while the three-month compounded S$ Singapore Overnight Rate Average (SORA) eased slightly to 0.1% in October.

OUTLOOK

3. Despite near-term uncertainties, the global economy should expand at an above-trend pace in the quarters ahead. In conjunction with a gradual domestic reopening, the Singapore economy should also continue on its recovery path and aggregate output should return to potential in 2022. As the labour market slack is absorbed and with imported inflation forecast to remain firm, MAS Core Inflation is expected to rise steadily from below 1% on average this year to 1–2% in 2022.

Growth Backdrop and Outlook

4. The *Advance Estimates* released by the Ministry of Trade and Industry on 14 October indicated that the Singapore economy expanded by 0.8% on a quarter-on-quarter seasonally-adjusted basis in Q3 2021, following a 1.4% contraction in the second quarter. With the turnaround, aggregate output returned to its pre-pandemic level after its setback in Q2. The sequential pickup in Q3 was largely due to the modern services sector, where activity was underpinned by firm growth in the information & communications industry. Meanwhile, the domestic-oriented sectors remained weak, with many affected by the tighter measures imposed in response to the increase in COVID-19 infections. In the manufacturing sector, output in the electronics and precision engineering industries expanded in July–August compared to Q2, while other industry clusters contracted. On a year-ago basis, GDP rose by 6.5% in Q3, the third consecutive quarter of increase.

5. The pace of global economic expansion slowed over the past six months as widespread outbreaks of the Delta variant weighed on demand for consumer-facing services and caused disruptions that constrained the fulfilment of goods orders. However, global economic prospects remain broadly intact. As existing vaccines have been effective in limiting severe illness from the dominant COVID-19 variant, and as inoculation rates rise globally, consumption activity should pick up while supply constraints ease. Global growth is forecast to come in above trend for the second consecutive year in 2022, even as uncertainties remain, including around the course of the pandemic.

6. Strengthening external demand and recovering domestic expenditure are expected to sustain a firm pace of growth in the Singapore economy in the quarters ahead. Growth in the trade-related and modern services sectors will be supported by the resilient electronics cycle and improving business activity. Some improvement in conditions in the domestic-oriented and travel-related clusters is also expected as Singapore transitions in a progressive but calibrated manner towards managing COVID-19 as an endemic norm.

7. GDP growth in the Singapore economy is expected to come in at 6–7% this year and register a slower but still-above trend pace in 2022. Barring the materialisation of tail risks such as the emergence of a vaccine-resistant virus strain or severe global economic stresses, the Singapore economy should remain broadly on an expansion path. The slack in the labour market should continue to be absorbed and the negative output gap close in 2022.

Inflation Trends and Outlook

8. MAS Core Inflation, which excludes the costs of accommodation and private transport, rose to 1.1% year-on-year in July–August, from 0.7% in Q2 this year. This mainly reflected the increase in global commodity prices in recent months, which passed through to electricity & gas tariffs and non-cooked food inflation. At the same time, higher wage costs have fed inflation in some domestic consumer items such as food & beverage services. CPI-All Items inflation rose by a smaller extent, to 2.5% from 2.3% over the same period, with the pickup in core inflation partly offset by lower private transport inflation.

9. In the quarters ahead, rising imported and labour costs, alongside the recovery in domestic activity, will support a broad-based pick-up in inflation. Imported inflationary pressures are likely to persist for some time amid strengthening global demand and lingering supply constraints. On the domestic front, wage growth is likely to be firm alongside the dissipation of labour market slack through next year. The accumulating business costs will pass through to consumer price inflation as the domestic economy reopens and private consumption recovers. Various service fee increases that were put on hold since the pandemic began, such as for transport, healthcare and education, could also resume.

10. Private transport inflation is likely to moderate next year against a slower pace of increase in COE premiums and petrol costs. However, accommodation inflation is expected to remain firm amid construction delays.

11. For 2021 as a whole, MAS Core Inflation will come in near the upper end of the 0–1% forecast range, and is expected to increase further to 1–2% in 2022. CPI-All Items inflation will come in around 2% in 2021 and average 1.5–2.5% next year

MONETARY POLICY

12. Growth in the Singapore economy is likely to remain above trend in the quarters ahead. Barring a resurgence of the virus globally or a setback in the pace of economic reopening, output should return to around its potential in 2022.

13. At the same time, external and domestic cost pressures are accumulating, reflecting both normalising demand as well as tight supply conditions. MAS Core Inflation is expected to rise to 1–2% next year, and close to 2% in the medium term.

14. MAS will therefore raise slightly the slope of the S$NEER policy band, from zero percent previously. The width of the policy band and the level at which it is centred will be unchanged. This appreciation path for the S$NEER policy band will ensure price stability over the medium term while recognising the risks to the economic recovery.

1 The International Economy

- The global recovery suffered a setback in Q2 and Q3 2021, weighed down by fresh waves of COVID-19 infections. The slowdown was more pronounced in Asia ex-Japan, where vaccination rates were generally lower and public health measures have been more stringent. Growth was firmer in the major advanced economies, as vaccinations have weakened the linkage between infections and economic activity.

- The turnaround in global aggregate demand, alongside the pandemic-related shift in consumption from services to goods, has interacted with various frictions affecting supply chains to drive a sharp rise in the prices of several important primary and intermediate inputs, including oil, metals, and semiconductors. The pass-through to consumer price inflation has in general been stronger in those economies where the demand recovery has been more rapid and complete.

- Global growth is projected to slow to 4.8% in 2022 from 5.6% in 2021 as the recovery in the major advanced economies matures and policy support is gradually withdrawn. Activity in the ASEAN economies is expected to pick up from Q4 as the region recovers from the more severe economic impact of the pandemic experienced this year.

- In the baseline, the current global price impulse should subside as disruptions affecting supply are progressively addressed. There is a risk that supply problems could prove more intractable, resulting in stronger and more persistent inflationary pressures than expected even as growth slows. However, residual labour market slack and well-anchored inflation expectations decrease the likelihood of price rises becoming entrenched.

1.1 Global Economy

Fresh virus outbreaks have weighed on economic activity, particularly in Asia ex-Japan

Global growth stalled in Q2 2021 after reaching 1.2% q-o-q SA in Q1[1]. The slowdown was driven by a resurgence in COVID-19 infections, although there were important differences across economies. Reported infections per capita were much higher in the G3 than in Asia ex-Japan[2] **(Chart 1.1)**. However, economic activity was more severely affected in the latter; the region's output contracted by 0.8% q-o-q SA in the quarter, compared with a strong, above-

[1] Global and regional GDP growth aggregates are weighted by economies' shares in Singapore's NODX, unless noted otherwise.

[2] The G3 grouping refers to the Eurozone, Japan and the US, while Asia ex-Japan refers to China, Hong Kong SAR, India, Indonesia, Malaysia, the Philippines, South Korea, Taiwan, Thailand and Vietnam.

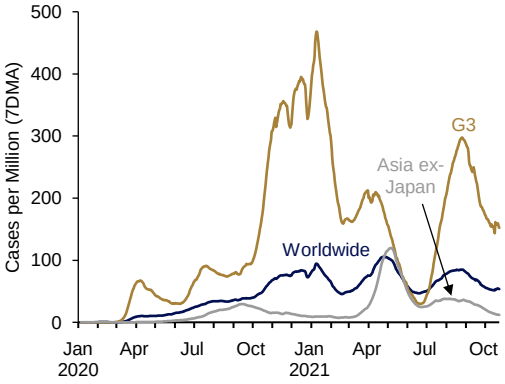
trend 1.6% expansion in the G3. The tighter relationship between infections and economic activity in Asia partly reflected generally lower vaccination rates in the region **(Chart 1.2)**. Public health measures were also more stringent in Asia ex-Japan **(Chart 1.3)**, resulting in a heavier drag on population mobility.

The number of new COVID-19 cases ebbed towards the end of Q2, but picked up again in Q3, particularly in the G3 economies. Differences in the impact of the pandemic on economic activity in the major advanced economies versus Asia ex-Japan persisted into Q3 2021. The G3 manufacturing PMI retreated from the most recent peak but continued to signal robust expansion **(Chart 1.4)**. In Asia ex-Japan, however, the gauge fell below the 50-point threshold in June, signalling contraction, and barely regained the 50 level in September.

The effects of the latest virus surge on services activity were more pronounced compared to manufacturing and broadly inversely correlated with economies' vaccination rates. In the US and Eurozone, services held up relatively well, with PMIs remaining above the 50-threshold in recent months. In Japan, where the pace of vaccination had until recently lagged other advanced countries, the services flash PMI came in at 50.7 in October, after recording readings below 50 from February 2020 to September 2021.

Chart 1.1 COVID-19 infections surged in Q2 2021, driven by the Delta variant

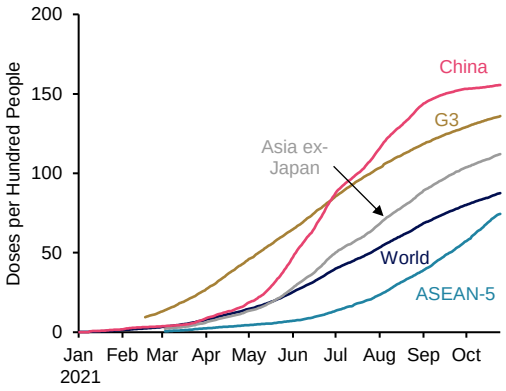
New COVID-19 infections



Source: WHO and EPG, MAS estimates

Chart 1.2 Vaccination rates in most of Asia ex-Japan have generally lagged the G3 and China

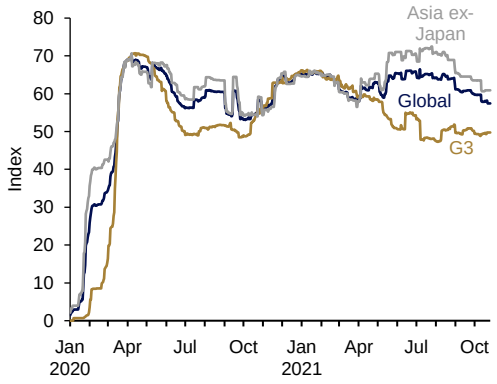
Total vaccine doses administered



Source: Haver Analytics and EPG, MAS estimates

Chart 1.3 Virus containment measures have been more stringent in Asia ex-Japan

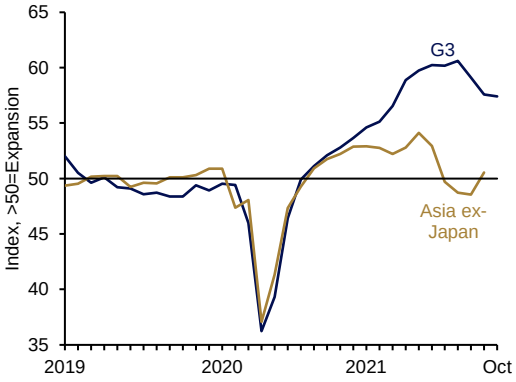
NODX-weighted indices of virus containment stringency[3]



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

Chart 1.4 Manufacturing PMIs have weakened more in Asia ex-Japan than in the G3

NODX-weighted manufacturing PMIs



Source: IHS Markit and EPG, MAS estimates

Differences in the degree of policy support have also contributed to observed divergences in economic performance. In advanced economies, sizeable fiscal stimulus supported households and businesses through the downturn and facilitated the subsequent rebound. According to estimates computed using IMF data[4], the total fiscal impulse over 2020 and 2021 in the G3 amounted to 4.3% of potential GDP, compared to 1.3% in Asia ex-Japan.

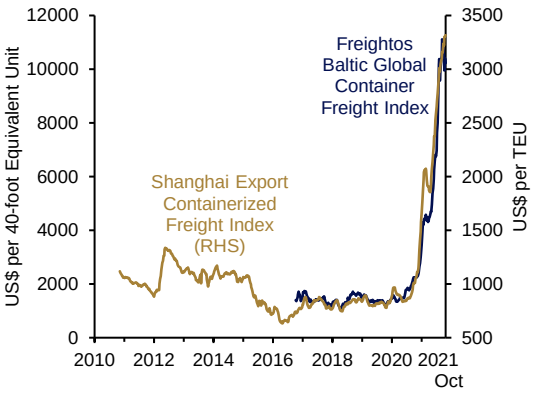
A build-up of disruptions affecting production and logistics in recent months has also hampered global economic activity. The greater stringency of public health measures in Asian economies has affected factory operations and transportation, disrupting global supply chains. In particular, an acute global shortage of semiconductors has impaired the supply of a wide range of consumer electronics and durable goods, including automobiles. Port closures, container shortages, reduced air cargo capacity due to fewer international passenger flights, and several extreme weather events have also resulted in transportation bottlenecks. Consequently, logistics costs have risen significantly in recent months **(Chart 1.5)**, manufacturing input prices have picked up, and supplier delivery times have lengthened **(Chart 1.6)**.

[3] The stringency index is derived by weighting each economy's overall measure of outbreak containment stringency by its weight in Singapore's NODX. Economies included in the indices are Australia, China, Eurozone, Hong Kong SAR, India, Indonesia, Japan, Malaysia, the Philippines, South Korea, Taiwan, Thailand, US and Vietnam.

[4] Data from the IMF October 2021 Fiscal Monitor. Aggregates are computed by weighting the annual change in the general government cyclically-adjusted primary balance (CAPB) (as % of potential GDP) by countries' nominal GDP.

Chart 1.5 Logistics costs have increased …

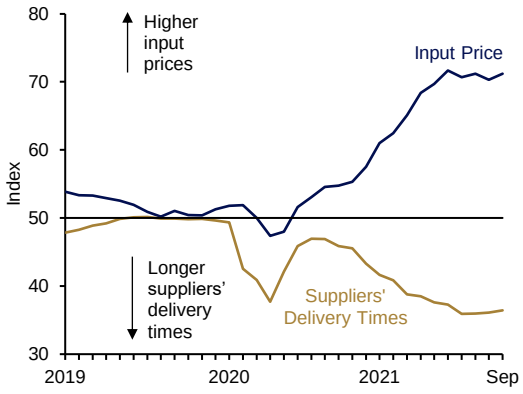
Container freight cost indices



Source: Bloomberg

Chart 1.6 … while manufacturing input prices and suppliers' delivery times have also risen

NODX-weighted global manufacturing PMI sub-indices for input price and suppliers' delivery times



Source: IHS Markit and EPG, MAS estimates

Inflation has risen considerably, mainly reflecting temporary supply-demand mismatches

Global economic output regained its pre-pandemic level in Q1 2021. Notwithstanding the setback in Q2 and Q3, the overall strengthening in aggregate global demand since the trough last year has interacted with recent supply chain bottlenecks to exert upward pressure on a range of prices, including commodities **(Chart 1.7)**. This has led to a sharp increase in y-o-y inflation rates in recent months. Global headline CPI rose by 2.8% y-o-y in September, after increasing by 2.6% in August, compared with a 2015–19 average of 1.7%.[5] The rise in prices has been most pronounced in the advanced economies, with G3 headline inflation reaching 4.4% in September **(Chart 1.8)**. In the US, headline inflation came in at 5.4%. Headline CPI inflation in Asia ex-Japan peaked at 2.9% in May and moderated to 1.7% in September.

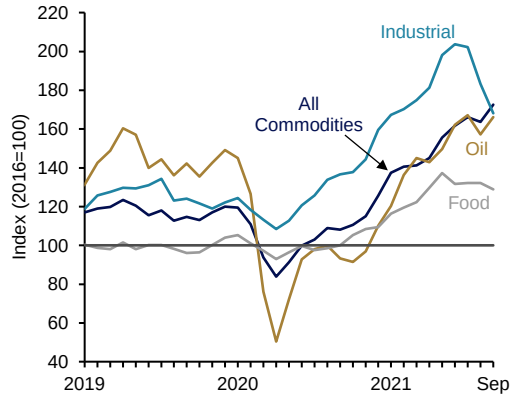
Base effects from the sharp drop in price levels during the acute phase of the COVID-19 crisis in 2020 have contributed to recent increases in headline y-o-y inflation, although this factor is now fading. Temporary supply-demand mismatches have also played an important role. In the US, for instance, the supply of goods and services has not caught up to the rapid recovery in demand, leading to cost and price pressures. In contrast, the slower demand recovery in many Asian economies has weakened the pass-through from the rise in upstream costs to consumer prices.

The rise in core inflation has been more moderate. G3 core inflation reached 3.1% y-o-y in September, compared to the H1 2021 average of 1.9%, while the Asia ex-Japan reading stood at 0.9% in September, reflecting the restraining effect of weaker demand on core inflation in many regional economies.

[5] Global and regional inflation aggregates are weighted by economies' shares in Singapore's direct imports.

Chart 1.7 Commodity prices have risen amid robust demand

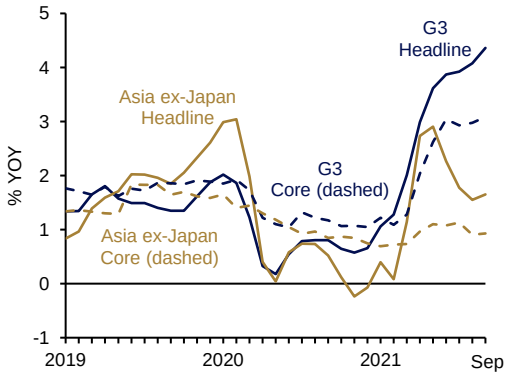
IMF commodity price indices



Source: Haver Analytics

Chart 1.8 Inflation in the G3 has accelerated by more than in Asia ex-Japan

Headline and core inflation



Source: Haver Analytics and EPG, MAS estimates

Note: Regional aggregates weighted by countries' shares in Singapore's direct imports.

Global growth is expected to remain above trend in 2022

Declining infections and easing movement restrictions across Asia ex-Japan are estimated to have boosted activity in Q3, although higher-frequency data suggests the region's underperformance relative to the G3 has likely persisted **(Chart 1.4 above)**. Growth is projected to rise in both the G3 and Asia ex-Japan in Q4, as ebbing infection waves and rising vaccination rates allow economies to reopen, buttressed by recent progress in the liberalisation of international travel.

The growth divergences observed across regions in Q2 and Q3 2021 should reverse in 2022. The recovery in the G3 is now maturing, and the impetus from policy support is expected to fade as the group's aggregate fiscal impulse turns negative. Conversely, Asia ex-Japan has further gains to realise from normalising economic activity, following more extensive vaccine deployment.

All in, the global economy is forecast to expand by 1.8% q-o-q SA in Q4 2021, after growing by 1.1% in Q3. Global GDP growth is projected to come in at 5.6% in 2021, and 4.8% in 2022 **(Table 1.1)**.

While the baseline forecast is for strong, above-trend growth in 2021 and 2022, the level of global real GDP is expected to still be 1.7% lower by the end of 2022 compared to projections made before the onset of the pandemic. The shortfall is concentrated in the Asia ex-Japan economies, where real GDP is forecast to be 2.8% lower by end-2022. By contrast, the G3 economies' GDP is expected to be about 0.6% higher by end-2022 compared to pre-pandemic forecasts, mainly due to the boost from substantial policy support.

Global inflation is projected at 2.6% in 2021, the strongest rate since 2011. Inflation is expected to remain elevated at 2.4% in 2022, reflecting a narrowing global output gap, even as supply problems are progressively resolved.

Table 1.1 Global GDP growth, NODX-weighted

	QOQ SA (%)			Annual (%)		
	2021 Q2	2021 Q3*	2021 Q4*	2020	2021*	2022*
G3	1.6	1.5	1.8	−5.0	4.9	4.1
Asia ex-Japan	−0.8	1.0	1.8	−2.2	5.9	5.1
ASEAN-5	−0.6	−0.2	2.4	−4.4	3.5	6.1
Global	**−0.1**	**1.1**	**1.8**	**−3.0**	**5.6**	**4.8**

Source: Haver Analytics and EPG, MAS estimates

* EPG, MAS forecasts

The pandemic, and associated supply disruptions, pose risks to the outlook for growth and inflation

The pandemic remains a source of considerable uncertainty. Higher vaccination coverage is gradually weakening the transmission from infections to mobility and economic activity. However, the possible emergence of more lethal and/or vaccine-resistant viral strains remains a material downside risk.

Pandemic-related supply constraints have also emerged as an important factor in the outlook for both growth and inflation. Supply bottlenecks are expected to fade in the early part of 2022 as a decline in new COVID-19 cases and rising vaccination rates permit a fuller relaxation of mobility restrictions. Nonetheless, there is a risk that supply problems could become entrenched. The decline in labour force participation rates observed since the outbreak of the pandemic in many economies may not reverse as completely or rapidly as anticipated, leading to more persistent upward pressure on wages that could eventually feed through to consumer prices.

The longer-term structural impact of the pandemic remains unclear. Changes in the sectoral composition of demand away from consumer-facing services towards goods, observed since the onset of widespread mobility restrictions, may prove enduring to some degree even after restrictions are lifted. This would in turn require more extensive adjustment of supply capacity and re-skilling of workers, contributing to more persistent supply constraints and complicating the estimation of output gaps during the period of transition.

As the economic recovery matures in the advanced economies, the impending withdrawal of monetary accommodation by the major central banks may lead to some tightening in global financial conditions, which could in turn impose strains on more vulnerable parts of the global financial system. It could also reduce policy space in some economies with higher external or fiscal funding needs, diminishing flexibility to respond to any further downside shocks.

1.2 The G3 Economies

Output growth in the G3 is expected to ease as recoveries mature over the course of 2022

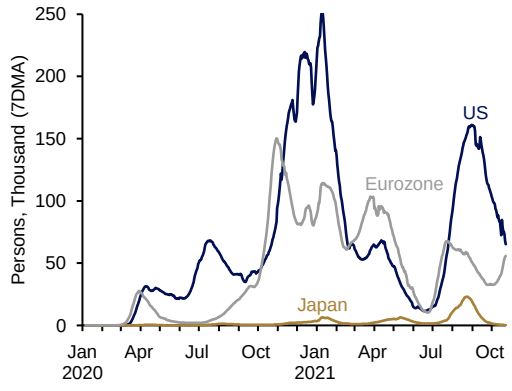
The G3 economies expanded by 1.6% q-o-q SA in Q2 2021, after growing by just 0.2% in Q1. The pickup in the Eurozone and Japanese economies was supported by loosened movement restrictions amid rising vaccination rates and declining new infections. Output growth in the US continued at a strong above-trend pace of 1.6% q-o-q SA in Q2, following the 1.5% recorded in Q1. The US recovery is far ahead of that in the other two G3 economies: as at Q2 2021, US GDP had risen to 0.9% above pre-pandemic levels, whereas output in the Eurozone and Japan was still 2.7% and 1.4% lower, respectively.

A renewed pickup in COVID-19 infections from July weighed on activity in Q3 2021 **(Chart 1.9).** The G3 composite flash PMI stood at 54.5 in October, compared to the recent peak of 58.9 in May. Services lost more momentum than manufacturing. The G3 services flash PMI in October was 3.0 points below the May reading, while the manufacturing reading had fallen by 2.8 points since May **(Chart 1.10)**.

The softening in the manufacturing production is partly driven by supply-side constraints. Significant shortages in important industrial inputs, including semiconductors, have weighed on the manufacturing sector. For example, industrial production in Germany and Japan was still 6.9% and 3.4% respectively below the pre-pandemic level in August. Private consumption and consumer confidence have also moderated in the G3 **(Chart 1.11)**.

Chart 1.9 The number of new virus cases has ebbed compared to the most recent peak

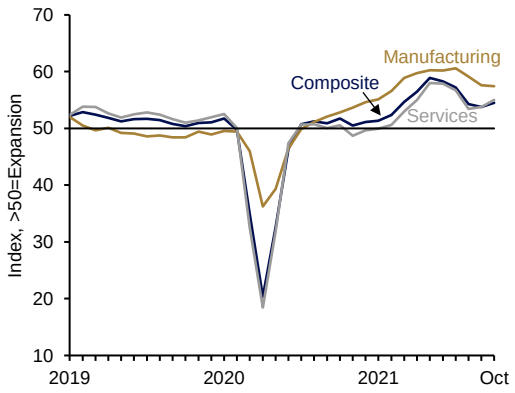
Number of new COVID-19 infections in the G3



Source: WHO and EPG, MAS estimates

Chart 1.10 Momentum in the services sector has eased more than manufacturing

NODX-weighted G3 PMI indices

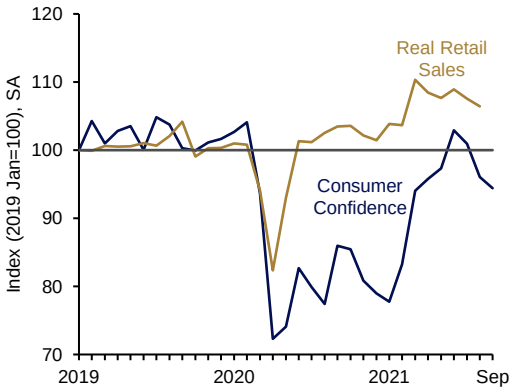


Source: IHS Markit and EPG, MAS estimates

G3 GDP growth is projected to come in at 1.5% q-o-q SA in Q3, before picking up to 1.8% in Q4 as new infections decline and economic reopening is further expanded. For the whole of 2021, growth is forecast to come in at 4.9%.

Chart 1.11 Consumer confidence and real retail sales fell in Q3, amid a pickup in infections

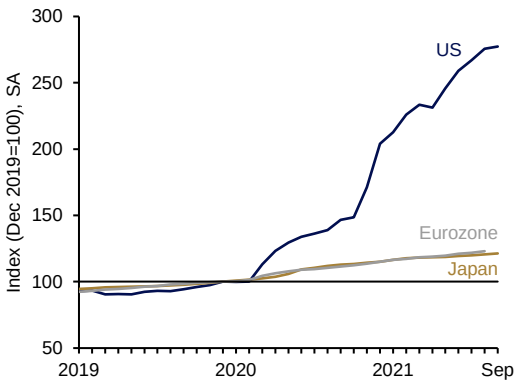
NODX-weighted indices of G3 consumer confidence and real retail sales



Source: Haver Analytics and EPG, MAS estimates

Chart 1.12 Demand deposits have increased significantly, especially in the US

Stock of demand deposits in the G3



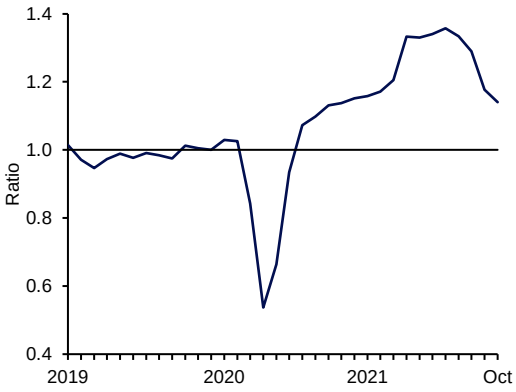
Source: Haver Analytics and EPG, MAS estimates

GDP growth in the G3 is expected to ease, but to remain above trend in 2022. In the base case, economic activity is expected to become less sensitive to the vagaries of the pandemic, as a sufficiently large majority of the population becomes fully vaccinated and countries shift to a public health strategy predicated on adapting to the endemic status of COVID-19. The attendant reopening and removal of restrictions is also anticipated to contribute to the easing of supply bottlenecks, including an increase in labour force participation.

The outlook for private demand is strong. Rising employment and wages are expected to support household incomes (see below). Moreover, households have accumulated significant savings during the pandemic, especially in the US, and this should continue to boost prospects for private consumption expenditure **(Chart 1.12)**. Business stocks were depleted during the period of supply disruptions, implying more rapid restocking as supply chain constraints ease **(Chart 1.13)**. In the medium term, rising manufacturing capacity utilisation should encourage firms to expand capital expenditure to meet their still-robust expectations for future final demand **(Chart 1.14)**.

Chart 1.13 A stock-building cycle is expected to support output in the short term

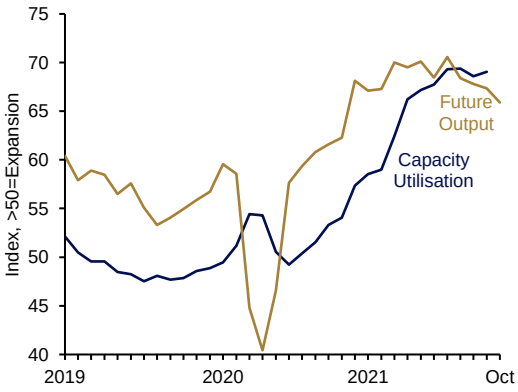
NODX-weighted G3 PMI new orders to stocks of finished goods ratio



Source: IHS Markit and EPG, MAS estimates

Chart 1.14 Manufacturing capacity is tightening, while businesses anticipate higher future output

NODX-weighted G3 PMI indices of future output and capacity utilisation



Source: IHS Markit and EPG, MAS estimates

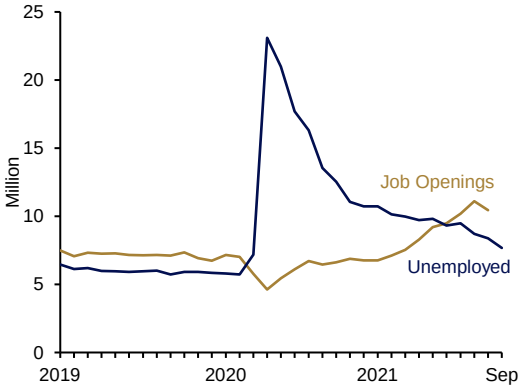
The anticipated strengthening in private demand is expected to permit some withdrawal of policy accommodation. Some major central banks have begun to signal their intent to wind down asset purchase programmes in the coming months. Fiscal policy will also tighten further next year. The G3 fiscal impulse is expected to be −1.6% of potential GDP in 2022, compared to −0.5% in 2021 and +4.8% in 2020[6]. Taken together, G3 GDP growth is projected to moderate to 4.1% in 2022.

Labour supply conditions have tightened in the US and increasingly in the Eurozone. These reflect an increase in job mismatches (i.e. jobseekers lacking the skills to fill vacancies), as well as an exit of some workers from the labour force. In the US, the number of job vacancies has been increasing while the number of unemployed has been declining **(Chart 1.15)**; however, the labour force participation rate of 61.6% is still 1.7% points below the pre-pandemic level. In the Eurozone, more businesses are indicating that labour shortages are limiting output **(Chart 1.16)**. Consequently, some upward pressure on wages has emerged. The average hourly wage in the US rose by 1.3% q-o-q in Q3, compared to an average rate of 0.7% per quarter from 2017–19. The compensation per employee in the Eurozone has also increased by 0.9% q-o-q in Q2, above the quarterly average of 0.5% from 2017–19.

[6] Data from the IMF October 2021 Fiscal Monitor. Aggregates are computed by weighting the annual change in the general government CAPB (as % of potential GDP) by countries' nominal GDP.

Chart 1.15 In the US, the number of job vacancies exceeds the number of jobseekers

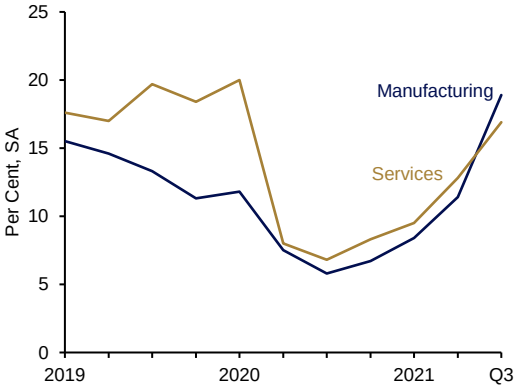
Number of job vacancies and number of unemployed in the US



Source: Haver Analytics and EPG, MAS estimates

Chart 1.16 Labour shortages are increasingly a limiting factor for businesses in the Eurozone

European Commission survey, % of businesses indicating that labour shortages are limiting output

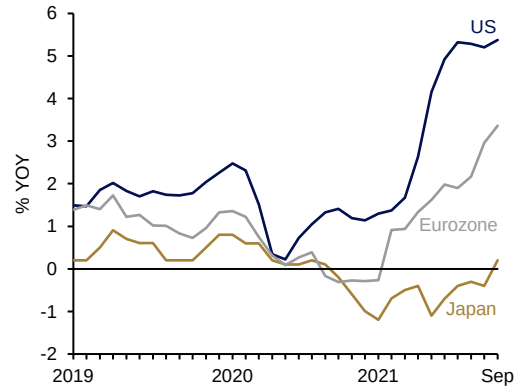


Source: Haver Analytics and EPG, MAS estimates

Consumer price inflation has accelerated in the G3, reaching 4.4% y-o-y in September. The increase has been faster in economies where the demand recovery has been more complete. The US headline CPI rose further to 5.4% in September, while inflation in the Eurozone stood at 3.4%, and 0.2% in Japan **(Chart 1.17)**. Inflationary pressures induced by supply-side shortfalls are expected to be largely temporary. Market-derived measures suggest that long-term inflation expectations have picked up in the G3 but remain well-anchored overall **(Chart 1.18).** Headline G3 inflation is projected at 3.3% in 2021 and 2.5% in 2022.

Chart 1.17 Inflation has risen sharply in the US and Eurozone

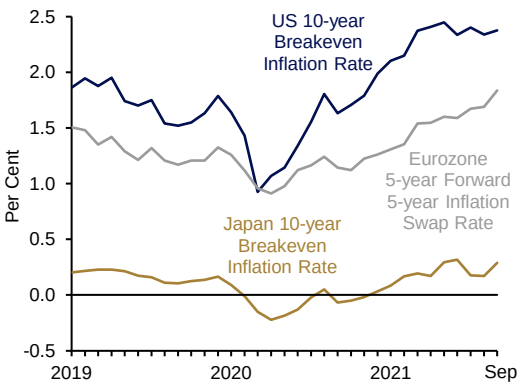
Headline inflation in the G3



Source: Haver Analytics and EPG, MAS estimates

Chart 1.18 Inflation expectations have remained within or are below central banks' targets

Breakeven inflation rates and forward swap rates in the G3



Source: Bloomberg

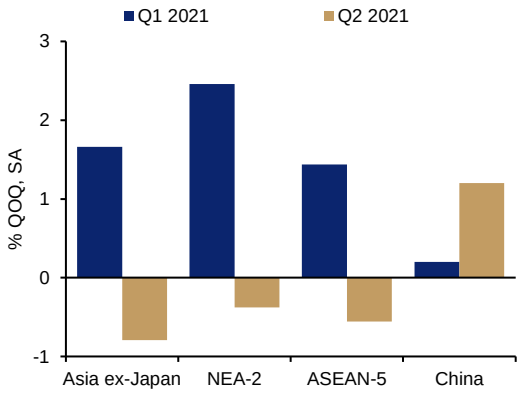
1.3 Asia ex-Japan

Resurgent infections set back the regional economic recovery in Q2

Output in Asia ex-Japan contracted by 0.8% q-o-q SA in Q2 amid a resurgence in infections, although the incidence of new COVID-19 cases and economic impact varied significantly across countries **(Charts 1.19 and 1.20)**. China was an outlier as its growth accelerated in Q2, reflecting a pickup in private consumption amid easing movement restrictions, a strengthening labour market, and rising disposable incomes.

Chart 1.19 The recovery has been set back …

GDP growth

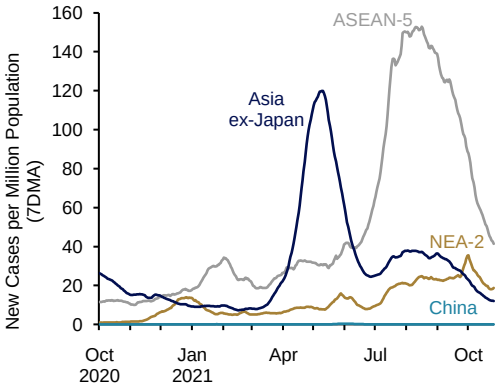


Source: Haver Analytics and EPG, MAS estimates

Note: The NEA-2 comprises South Korea and Taiwan.

Chart 1.20 … due to renewed virus outbreaks

Number of new COVID-19 infections in Asia ex-Japan



Source: CEIC, WHO and EPG, MAS estimates

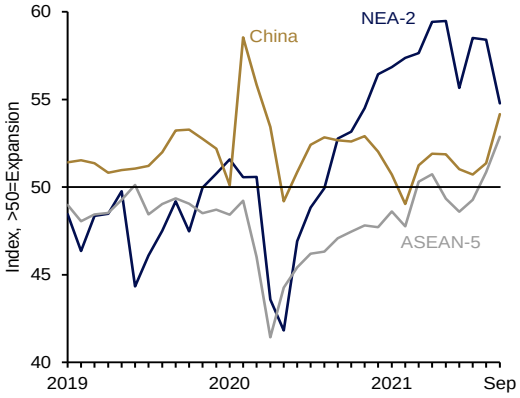
In Q3 2021, higher-frequency data suggest aggregate activity in Asia ex-Japan is likely to have strengthened sequentially, but with variation in performance across economies. Countries that had experienced deeper contractions in Q2, or those in which COVID-19 outbreaks subsided earlier, are likely to have recorded stronger recoveries. However, in some ASEAN countries, public health measures persisted into Q3 amid renewed virus outbreaks, dampening demand as well as periodically disrupting factory operations. The temporary closures and migrant labour shortages led to a surge in backlogs of work **(Chart 1.21)**, and longer suppliers' delivery times.

Mobility restrictions have also affected the recovery of regional consumption in Q3. Retail sales volumes recently rose in several economies, including Hong Kong and Malaysia, but fell in others **(Chart 1.22)**. Stringent public health measures have weakened demand for contact-dependent services, while factory closures and weak employment have affected household incomes and consumer sentiment, thereby dampening the demand for goods.

In China, intensified industry-specific regulation, particularly in the energy and real estate sectors, likely affected growth towards the end of Q3 2021. Tighter regulation aimed at curbing the rise in leverage in the real estate sector has contributed to a slowdown in property transactions, with spillovers to associated demand (e.g., retail sales of home appliances). In the energy sector, electricity rationing imposed by local governments to meet energy consumption targets has constrained industrial activity.

Chart 1.21 Backlogs continued to rise amid disruptions to factory operations

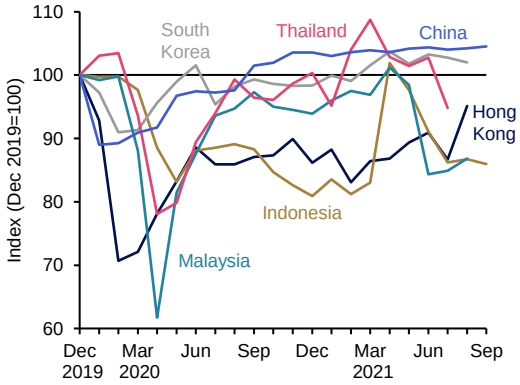
NODX-weighted backlogs sub-indices of manufacturing PMIs



Source: IHS Markit and EPG, MAS estimates

Chart 1.22 The recovery in retail sales has been hindered by the spread of the Delta variant

Retail sales volume



Source: Haver Analytics and EPG, MAS estimates

Note: The index for China was computed by deflating nominal retail sales by the retail price index.

Broadly, across the region, lower-income economies have been more exposed to the recent rise in global commodity prices. Global food prices increased by 29.3% y-o-y on average from January to September 2021. Given the substantial share of food in consumption baskets, CPI inflation has risen considerably in some countries, including the Philippines **(Chart 1.23)**. Food expenditures make up an average of 32.6% of ASEAN-4 CPI baskets, much higher than the 20.7% share in the G3.

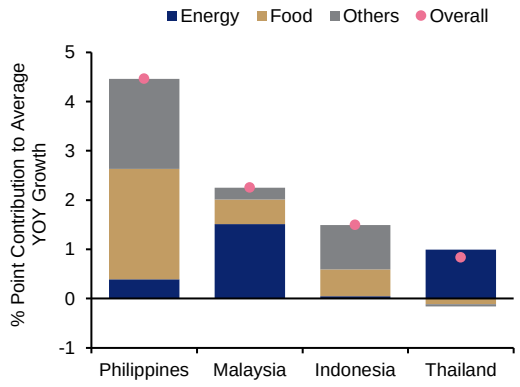
The increase in global energy prices has been particularly marked. Brent crude oil prices rose by an average of 64.3% y-o-y from January to September, to reach US$83 per barrel in October 2021. The transmission of higher energy prices to economic conditions varies depending on countries' patterns of usage, size of energy subsidies, and trade balance. Fuel accounts for an average of 11.6% of CPI baskets in ASEAN-4, compared to 8.0% in the G3. The pass-through of energy prices to CPI inflation differs across the region, ranging from 0 to 1.5% points of headline inflation in Jan–Sep 2021 compared to the same period in 2020 **(Chart 1.23)**. In Indonesia, where the CPI passthrough has been negligible, energy subsidy spending has risen 37% y-o-y from Jan–Aug. The Philippines has provided subsidies for fuel and other operational expenses to drivers of public utility vehicles such as buses and jeepneys. In Thailand, where pass-through has been stronger, the government announced a cap on retail diesel prices in early October.

Indonesia and Malaysia are net fuel exporters, while the other three ASEAN-5 economies are substantial net importers. Accordingly, the impact on terms of trade and external accounts will differ **(Chart 1.24)**. Significant energy producers will also see a fiscal offset on the revenue side. The IMF estimates that oil and gas revenues will contribute 0.6% of GDP in 2021 in Indonesia, the same amount as the government's estimated energy subsidy expenditure for the year. In Malaysia, fiscal oil and gas revenues account for 2.4% of GDP, while the government has indicated it will spend 0.5% of GDP on subsidies for fuels and cooking oil this year.

From a general equilibrium perspective, subsidies impose a wedge to the economy's adjustment following a sustained increase in energy prices. CPI data suggest Indonesian and Philippine consumers have been most shielded from the impact of higher fuel costs so far, implying that the adjustment of consumption patterns in those economies may be more muted. However, as Indonesia is a net fuel exporter and Philippines is a relatively modest net importer, the overall impact on the external finances will be contained.

Chart 1.23 Higher energy prices have added to inflationary pressures

Percentage point contribution to average y-o-y CPI inflation, Jan–Sep 2021

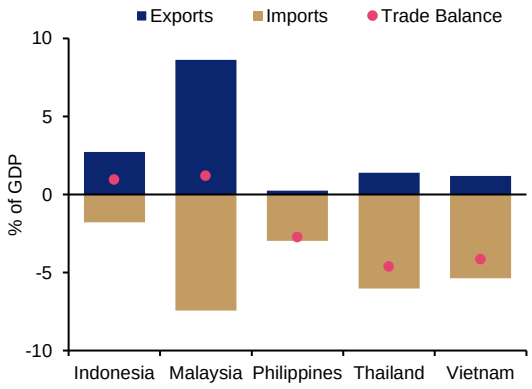


Source: Haver Analytics, and EPG, MAS estimates

Note: Vietnam does not have sufficiently detailed CPI weights to compute the breakdown.

Chart 1.24 The impact on net trade will vary

Trade in mineral fuels, lubricants and related materials, 2019–20 average



Source: UN Comtrade, Haver Analytics, and EPG, MAS estimates

The recovery in Asia ex-Japan is expected to gain momentum from Q4, but the pandemic poses continued uncertainties

Growth in Asia ex-Japan is expected to pick up in the remainder of 2021 and into early 2022, as rising vaccination rates and declining infections permit a relaxation of public health measures, both of which would bolster demand and ease production and logistics constraints. Exports should receive support from firm demand in the G3. As the pandemic wanes, the demand for electronics products is likely to normalise to some extent, although the ongoing adoption of 5G is expected to provide structural support. This should benefit regional economies that are closely integrated in electronics production networks.

There is some evidence that supply bottlenecks affecting the electronics sector partly reflect past underinvestment in manufacturing capacity, albeit intensified by strong demand for electronics and pandemic-related production disruptions. There has been a marked drop in the semiconductor inventory-to-shipment ratio in South Korea since early 2019, pre-dating the pandemic **(Chart 1.25)**. Semiconductor supply is expected to improve gradually in the medium term as producers expand and upgrade manufacturing capacity.

Services exports will be bolstered by the gradual resumption of cross-border leisure travel, as vaccination rates rise and more economies transition to an endemic COVID-19 state. The International Air Transport Association expects total passenger numbers to grow

from 2.3 billion in 2021 to 3.4 billion in 2022, about three-quarters of the level in 2019.[7] This will provide further support to regional economies that are more reliant on tourism. Overall, GDP in Asia ex-Japan is expected to grow by 5.9% in 2021, moderating to 5.1% in 2022.

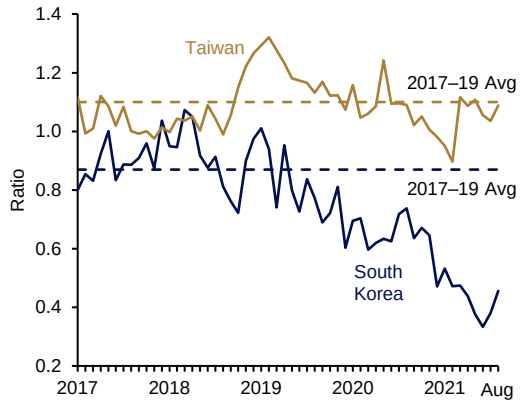
Headline inflation in Asia ex-Japan rose sharply in Q2, in part driven by rising fuel and food prices, but has eased somewhat in Q3. Price pressures are expected to be contained, as substantial economic slack remains in many countries. Headline Asia ex-Japan inflation is projected at 2.2% in 2021 and 2.4% in 2022.

The economic outlook for Asia ex-Japan is subject to considerable uncertainty. First, the pandemic continues to pose a significant downside risk to demand, particularly for regional economies where vaccination deployment is taking longer. Second, partly as another facet of pandemic-related risk, disruptions affecting production may persist for longer than anticipated in the baseline, holding back output and exports. Third, a more pronounced-than-expected slowdown in China would have negative spillovers to Asian economies that have significant trade interlinkages **(Chart 1.26)**.

Fourth, some regional economies remain vulnerable to tighter global financial conditions and volatility in capital flows. Net portfolio capital flows into EMs have already slowed thus far in 2021 **(Chart 1.27)**. Reduced access to external financing could limit the policy space available to some governments and inhibit their response to further negative shocks. For those countries where the recovery from the pandemic remains incomplete, higher global interest rates may worsen the terms of their trade-off between external and domestic stability objectives.

Chart 1.25 Growth in semiconductor exports will be hindered by supply constraints

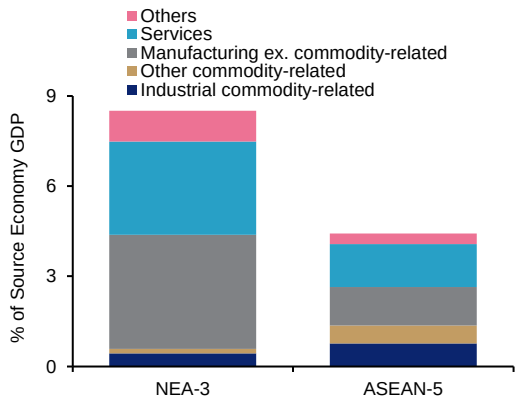
Semiconductor inventory to shipment ratio



Source: Haver Analytics, and EPG, MAS estimates

Chart 1.26 A deeper downturn in China is a downside risk to the outlook for Asia ex-Japan

VA in China's final demand



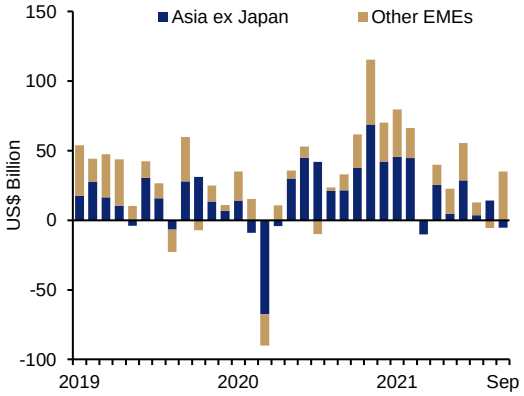
Source: OECD TiVA, and EPG, MAS estimates

Note: Weighted by economies' nominal GDP. Data for 2015. The NEA-3 comprises Hong Kong, South Korea and Taiwan.

[7] IATA, "Losses reduce but challenges continue — cumulative $201 bn losses for 2020–2022" Press Release No. 64, 4 Oct 2021.

Chart 1.27 EM net portfolio inflows have moderated

Net portfolio flows into emerging markets



Source: Institute of International Finance and EPG, MAS estimates

2 The Singapore Economy

- Singapore's economic recovery stalled over the last two quarters amid a resurgence in COVID-19 infections in the community. GDP contracted by 1.4% q-o-q SA in Q2 2021, before turning in marginal growth of 0.8% in Q3. Domestic-oriented activity was curtailed by mobility restrictions to slow the transmission of the virus, while the external-facing trade-related and modern services sectors fared better and provided some support to overall growth. As at Q3 this year, output in the economy had returned to its pre-pandemic level on aggregate, although there remained significant disparities in performance across industries.

- The economy is expected to continue on its expansion path in the coming quarters as movement restrictions are progressively eased in line with the government's reopening plans. The domestic-oriented sector should see a gradual pickup in activity, while prospects for the travel-related sector have also improved slightly even though its recovery is likely to be protracted. Meanwhile, the trade-related and modern services clusters will be supported by recoveries in major trade partners and continued strength in global electronics demand. Growth in the Singapore economy is expected to come in at 6–7% in 2021, and register a slower but still-above trend pace in 2022, barring the materialisation of downside risks arising from the evolution of the virus or global economic developments.

- Singapore's merchandise trade flows have held up relatively well amid global supply chain disruptions wrought by the pandemic. Electronics exports in particular have been a source of strength since last year. The relatively upstream nature of Singapore's production, such as of semiconductors, is an important reason why domestic manufacturers are less affected by supply bottlenecks. Sources of imports of intermediate and consumption goods are also generally well-diversified, thus ensuring the resilience of domestic supply against external shocks.

2.1 Recent Economic Developments

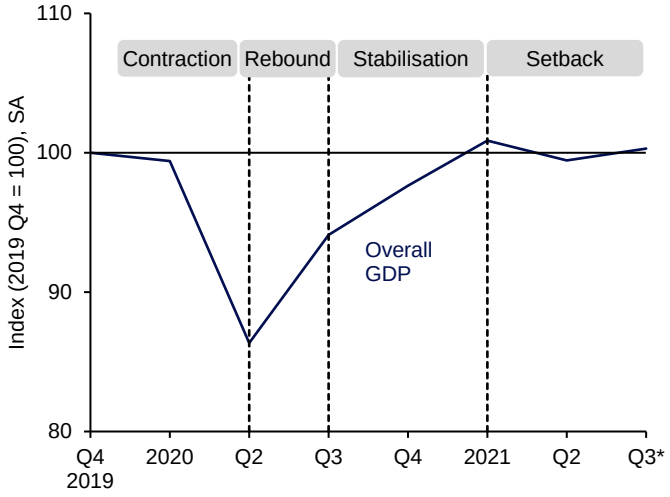
Singapore's economic recovery experienced a setback in Q2 and early Q3 2021

Growth in the Singapore economy has been subjected to "fits and starts" since the beginning of this year, as successive waves of infections have led to the re-imposition and subsequent lifting of movement restrictions. Disruptions to activity in certain sectors contributed to a flatlining of the overall GDP profile in Q2 and Q3 **(Chart 2.1)**. However, the pullback in activity was less severe than during the circuit breaker period in Q2 2020 as this year's restrictions were generally less stringent, and firms have adapted to some extent, pivoting to alternative means of doing business in tandem with the changes in public health

measures. In addition, there was some support from the external-facing sectors, which helped offset the weakness in the sectors that were most affected by restrictions.

Chart 2.1 The Singapore economy has gone through several phases of adjustment during the COVID-19 pandemic

Phases of economic contraction and expansion



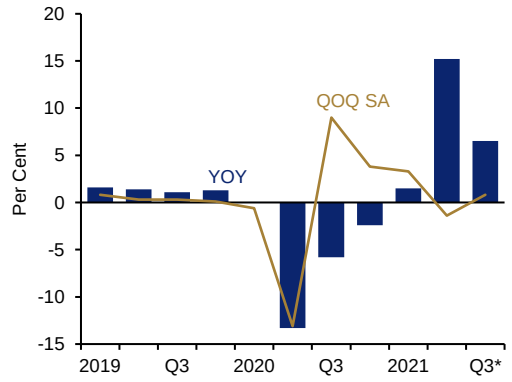
Source: DOS

* Advance Estimates

Singapore's GDP contracted by 1.4% q-o-q SA in Q2 2021, before expanding by 0.8% in Q3 based on the *Advance Estimates* **(Chart 2.2)**. The domestic-oriented cluster was weak, with many industries affected by the heightened alert measures imposed in Q2 and into early Q3, before the preparatory stage of transiting to an endemic COVID-19 environment began around mid-August **(Chart 2.3)**. Meanwhile, activity in the trade-related cluster levelled off in Q3 after contracting in Q2. Modern services contributed positively to overall GDP growth in both Q2 and Q3, even as growth momentum slowed at the margin. In y-o-y terms, GDP expanded by 15.2% in Q2, before moderating to 6.5% in Q3.

Chart 2.2 GDP expanded by 0.8% q-o-q SA in Q3 2021, following the 1.4% decline in Q2

Singapore's GDP growth

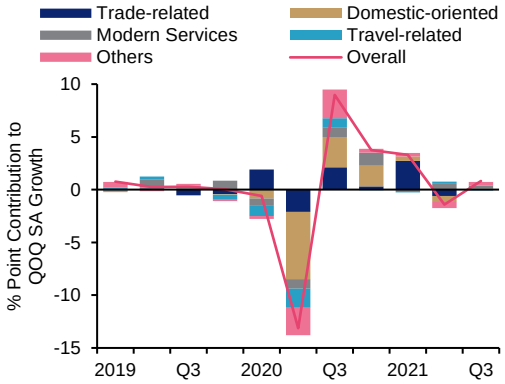


Source: DOS

* Advance Estimates

Chart 2.3 The domestic-oriented cluster was affected by heightened alert measures

Contribution to GDP growth



Source: EPG, MAS estimates

Overall, output in the economy returned to its pre-pandemic level in Q3 following the setback in Q2 this year. While the trade-related and modern services clusters surpassed their pre-pandemic levels by around 10% and 5% in Q3, the domestic-oriented cluster remained some 10% below its pre-crisis level. The travel-related cluster continued to lag substantially behind, with output at only half its pre-COVID level.

Mobility fluctuated in line with the stringency of social restrictions

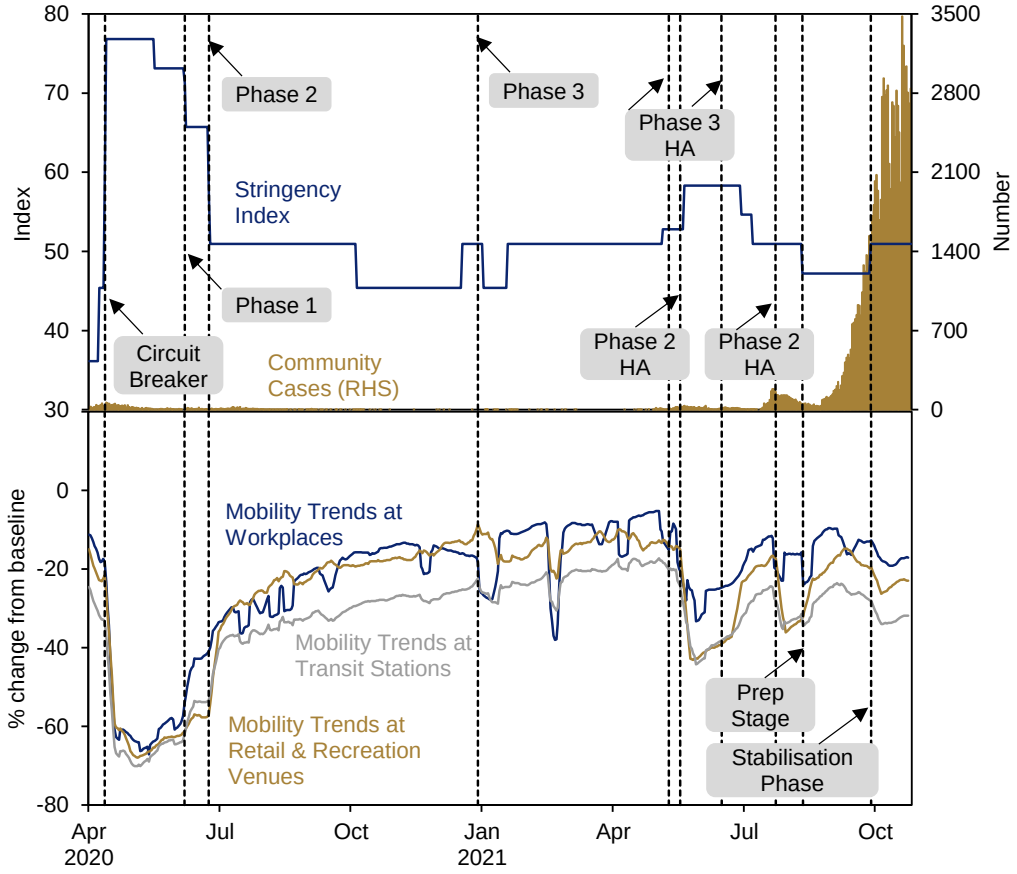
Over the last two quarters, Singapore went through several phases of social restrictions. The move to Phase 2 (Heightened Alert) (P2HA) status in mid-May included a ban on dining-in at food establishments, limits on gatherings to two persons, and suspension of personalised mask-off services. The stringency index saw an uptick from 50 in early May 2021 to 60 by the end of the month **(Chart 2.4)**, but remained considerably below the level during the circuit breaker in Q2 last year. However, data on footfall from Google's location notification services showed that mobility at retail and recreational venues fell sharply to 40% below the pre-pandemic baseline from around 20% previously, suggesting a higher degree of voluntary social distancing as caution set in among the public amid the increase in community infections. While footfall recovered in the second half of June after the transition back to Phase 3 (Heightened Alert), it fell again in early Q3 as the emergence of large COVID-19 clusters linked to multiple entertainment establishments, the Jurong fishery port, wet markets and hawker centres prompted a reversion to P2HA from 22 July to mid-August.

In mid-August, Singapore entered the "preparatory stage", the first of a four-stage reopening plan to transit to a COVID-resilient state. The steps included a resumption of dining-in at food establishments for up to five fully-vaccinated persons, raising the size of social gatherings and capacity limits for large events, and allowing up to half of employees working from home to return to the workplace. Google's mobility index showed an uptick in footfall in workplaces, retail and recreational venues and bus and train stations. Towards late August however, daily community cases began to rise sharply again. Despite the high level of vaccination coverage in the population (about 80%), the government delayed plans to open up the economy further in early September, with the public urged to reduce non-essential

social activities. Subsequently towards end-September, mobility measures were tightened to stabilise the health situation. As a result, the stringency index saw a marginal uptick from 47 to 50, and mobility also dipped.

Chart 2.4 Mobility levels fell in tandem with tightened restrictions

Stringency index, daily community cases & Google mobility trends (as at 25 Oct 2021)



Source: University of Oxford Blavatnik School of Government, MOH and Google Community Mobility Report (Singapore)

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

The recovery in the domestic-oriented cluster was held back by several rounds of heightened alert measures

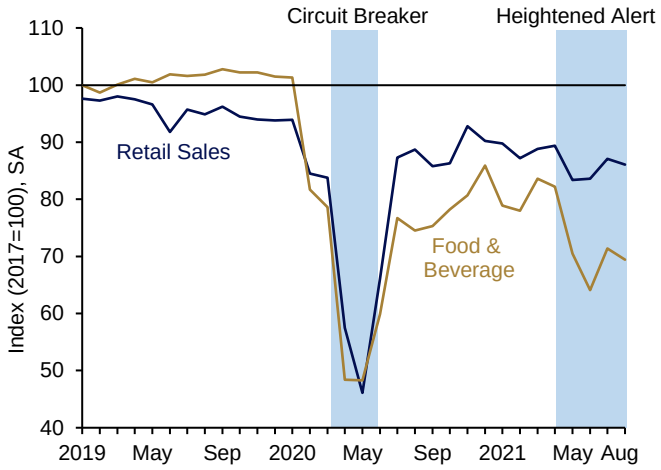
In the consumer-facing sector, food & beverage services sales contracted by 9.9% q-o-q SA in Q2, reflecting the prohibition on dining-in during P2HA **(Chart 2.5)**. Sales were also adversely affected by the cessation of dining-in at all establishments from mid-July to 9 August during the second round of P2HA, and by the restrictions on group sizes depending on vaccination status thereafter. F&B sales declined by 2.6% in Jul–Aug compared to Q2, with restaurants recording the largest fall (−8.9%), while sales at fast food restaurants saw a slight uptick (+1.2%).

Retail sales contracted by 3.5% q-o-q SA in Q2, but returned to growth of 1.3% in Jul–Aug. Outturns varied across the retail categories. While sales volumes of discretionary goods such as wearing apparel & footwear, watches & jewellery, and items in department stores

expanded sequentially by 3–8% in Jul–Aug, due mainly to promotional events, retailers of furniture & household equipment and computer & telecommunication equipment reported sales declines. Meanwhile, motor vehicles sales contracted by 7.0% in the first two months of Q3, extending the decline from the previous quarter. Major automobile producers have reported production disruptions due to the shortage of semiconductor chips, resulting in a backlog of car shipments to Singapore.

Chart 2.5 Recovery in the retail and F&B sectors stalled

Retail and F&B sales volumes



Source: DOS

Construction activity remained lacklustre as supply-side constraints continued to weigh on the sector

Activity in the construction sector declined by 2.4% q-o-q SA in Q2, dampened by supply-side disruptions following the suspension of the entry of foreign workers from India since late April and from other South Asian countries since early May. Further, construction companies that are heavily reliant on building materials from Malaysia were hit by its strict nationwide Movement Control Order. In Q3, Singapore's border restrictions on the entry of migrant workers and a rising number of COVID-19 infections in worker dormitories continued to constrain manpower. Raw material costs for cement, granite and steel reinforcement bars also saw steep increases of 11–47% in Q3 2021 compared to Q4 2020. As a result, the construction sector contracted further by 0.4% in Q3. Nonetheless, there was some improvement in private sector construction activity. Private certified payments rose at a faster clip of 14.1% in Jul–Aug compared to Q2, underpinned by strength in industrial building works.

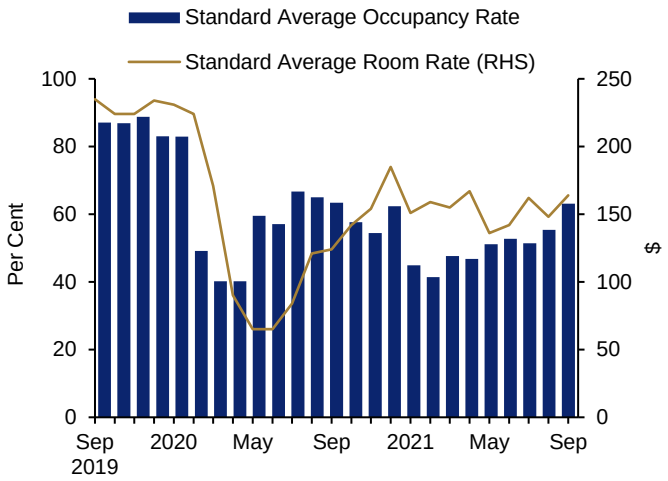
The travel-related cluster remained sluggish

With the added border restrictions in place, monthly visitor arrivals averaged 17,224 in Apr–Sep, a 25% reduction from Q1. The fall in arrivals from South Asia and ASEAN more than offset increased arrivals from China. In the accommodation sector, hotel occupancy rates rose by 6% points to 50% in Q2 and increased further to 57% in Q3 **(Chart 2.6)**. In the absence

of a discernible improvement in visitor arrivals, government bookings and staycation activities continued to be the main support for the accommodation industry. Meanwhile, the air transport industry saw a pickup from Q1. Monthly air passengers carried rose by around 50% to 204,273 in Q2, and a further 14% in Jul–Aug 2021. Air cargo increased by 14% in Q2 and posted a marginal increment of 0.3% in the first two months of Q3. Nonetheless, the number of aircraft landings and air passengers carried remained extremely low relative to pre-COVID levels, at 35% and 4.5% respectively.

Chart 2.6 Hotel occupancy has inched up since the beginning of the year

Hotel statistics



Source: STB

Trade-related activity saw some pullback, although the electronics-related industries continued to expand

Singapore's Index of Industrial Production (IIP) expanded by 2.3% q-o-q SA in Q2 2021, before contracting slightly by 0.3% in Q3 2021.[1] A large part of the decline was due to weakness in the chemicals and biomedical clusters, which outweighed growth in electronics and precision engineering **(Chart 2.7)**. After expanding by 1.3% q-o-q SA in Q2, output in the chemicals cluster shrank by 7.6% in Q3, affected by plant maintenance shutdowns in the petrochemicals and specialty chemicals industries. Similarly, output in the biomedical cluster fell by 7.5% in Q3, a reversal from the 10.2% expansion in Q2. The recent weakness in biomedical output was attributable to a different mix of active pharmaceutical ingredients produced.

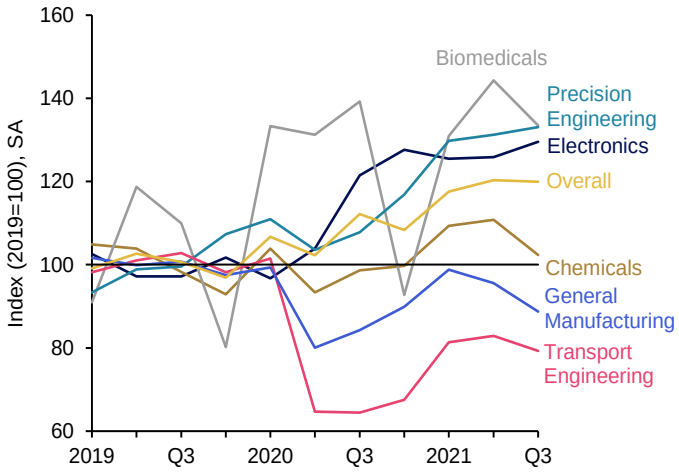
In contrast, growth in electronics production rose from 0.3% q-o-q SA in Q2 to 3.0% in Q3, supported by strong underlying global chip demand. The precision engineering industry grew by 1.4% in Q3, up from 1.1% in the previous quarter, with the machinery & systems sub-segment ramping up production of semiconductor equipment to meet strong capital

[1] Sequential SA growth rates of manufacturing VA are not the same as those of IIP due to different seasonal factors, but their y-o-y growth rates are similar.

investment demand globally, though this was partially offset by weakness in the modules & components sub-segment.

Chart 2.7 Industrial production was supported by strength in the electronics and precision engineering clusters

Index of industrial production



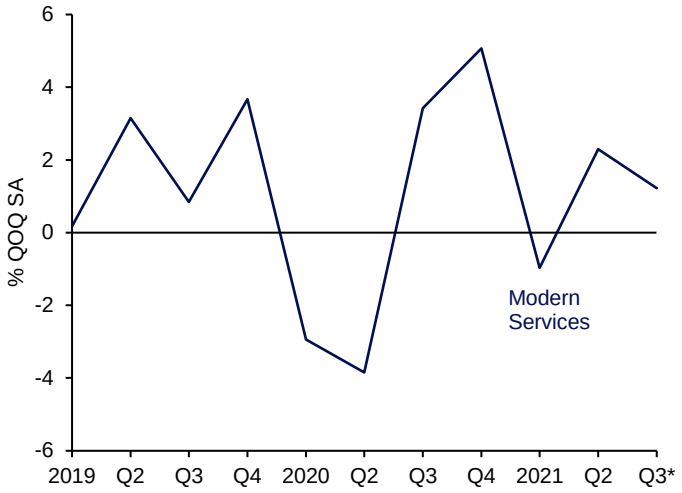
Source: EDB

Overall GDP growth in the past two quarters was largely supported by modern services

The finance & insurance, information & communications, and professional services sectors collectively expanded by 2.3% q-o-q SA in Q2, before moderating to 1.2% in Q3 **(Chart 2.8)**. The loss in momentum was mainly attributable to the finance & insurance sector. Specifically, the banks segment was weighed down by a decline in net fees and commissions. Meanwhile, the sentiment-sensitive segments turned in a mixed performance. While security dealing activities continued to decline on account of weaker futures trading volumes, the forex segment surged on the back of strong global forex turnover. Further pockets of resilience were found in the insurance and other auxiliary activities segments. The former benefitted from continued strength in the life insurance sub-segment, bolstered by robust demand for single-premium life insurance products that paid out competitive interest returns amid the fall in bank deposit rates, while the latter was supported by the continued shift towards e-payments.

Chart 2.8 Growth of modern services held up

VA growth of the modern services cluster



Source: DOS

* Advance Estimates

The rest of modern services expanded in Q2 and gained momentum in Q3. The information & communications sector was supported by firm growth in the IT & information services segment amid the ongoing digitalisation push and 5G-related initiatives which spurred demand for application development and web-hosting. The other information services segment also saw stronger revenue streams for gaming software publishers. In professional services, growth was buoyed by the improved performances of the headquarters & business representative offices and architectural & engineering segments, though the legal and accounting segments remained lacklustre.

Private consumption expenditure bore the brunt of mobility restrictions

From the expenditure perspective, the impact of the P2HA measures enacted in Q2 2021 fell mainly on private consumption expenditure (PCE) **(Chart 2.9)**. Services consumption, including food services and public transport, was hit particularly hard. Accordingly, PCE fell by 3.5% in Q2 2021, reversing the 2.1% growth in the preceding quarter. Based on MAS' estimates, it is likely that PCE remained weak in Q3 as the measures were still largely in place.[2]

In comparison, government consumption expenditure (GCE) and net exports helped bolster economic activity in Q2. These two components were the main support to growth during the pandemic and were already more than 10% above Q4 2019 levels as at Q2 this year **(Table 2.1)**. GCE was underpinned by Budget measures, while the boost to net exports resulted from a smaller decline in real exports compared to imports.

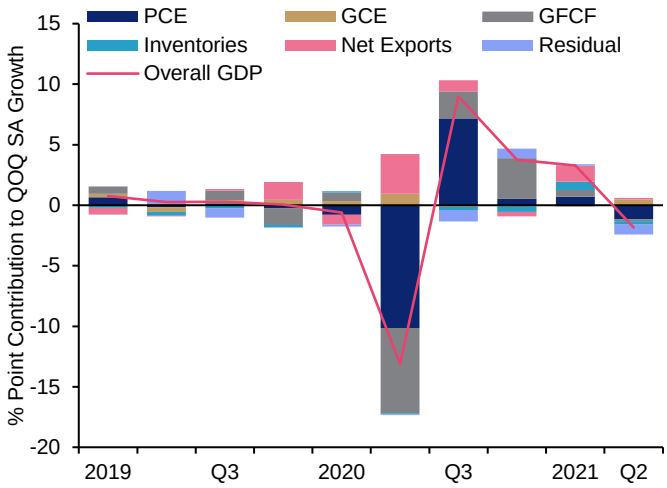
Gross fixed capital formation (GFCF) recovered from its trough of around 74% of the pre-crisis level in Q2 2020 to 97% in Q2 this year, driven by the gradual improvement in residential

[2] However, resident spending in Singapore is estimated to have already returned to its pre-pandemic level, while expenditures of residents abroad remained about 85% below pre-crisis level.

investment. Private structures investment remained sluggish, while private equipment investment[3] had already exceeded its pre-crisis level by the end of last year, reflecting firms' capital expenditure on machinery including on the continued automation of processes.

Chart 2.9 Private consumption weighed on GDP growth in Q2 2021

Contribution of expenditure components to GDP growth



Source: DOS and EPG, MAS estimates

Table 2.1 Private structures investment and private consumption remained below pre-pandemic levels

Expenditure components of real GDP

	Index (Q4 2019=100), SA		
Component (share of 2020 GDP)	Q2 2020	Q4 2020	Q2 2021
Private Consumption (33.0%)	70.8	88.7	87.4
Government Consumption (12.4%)	111.9	110.2	113.9
Gross Fixed Capital Formation (21.5%)	73.8	95.1	96.6
Residential Building Investment (Pte and Pub) (2.8%)	41.8	92.4	103.1
Private Structures Investment (2.2%)	47.1	81.0	76.1
Private Equipment Investment (13.3%)	92.0	104.9	101.0
Public Structures Investment (2.2%)	57.0	68.3	99.7
Public Equipment Investment (0.9%)	105.7	96.0	115.5
Net Exports (31.9%)	108.8	110.5	115.5

Source: DOS and EPG, MAS estimates

Note: Shares in GDP do not sum up to 100% as changes in inventories and statistical discrepancy are not shown in the table.

[3] Structures investment refers to non-residential buildings and other construction & works, while equipment investment refers to machinery and transport equipment as well as intellectual property products.

2.2 Economic Outlook

The Singapore economy is expected to continue growing at an above-trend pace in 2022

Amid a surge in COVID-19 cases, social restrictions were tightened for two months from late September in a bid to slow the number of new infections and allow new healthcare protocols to become effective. These "stabilisation phase" measures are expected to dampen domestic economic activity in early Q4 2021. As the strategy of treating the virus as endemic remains intact, there will likely be a gradual relaxation of the current restrictions in the latter part of this quarter and into next year. For 2021 as a whole, Singapore's GDP growth is projected to come in at 6–7%. The economy is expected to expand at a more moderate but still above-trend pace in 2022, barring the materialisation of downside risks, such as further mutations of the virus which are resistant to existing vaccines. The domestic-oriented and travel-related clusters should see a gradual improvement as the economy progressively reopens, while growth in the trade-related and modern services sectors will be supported by the recovery in the global economy.

The consumer-facing industries should see a pickup in activity in the coming quarters

The recovery of the consumer-facing industries such as F&B, retail and land transport will be held back in early Q4 by the prevailing high number of COVID-19 cases in the community. For around two months from 27 September, the size of social gatherings and dining-in was reduced from five to two persons, and working from home became the default for employees again. In addition, with effect from 13 October, unvaccinated individuals would not be able to dine in, even at hawker centres or coffee shops, nor enter malls or visit attractions. Nevertheless, there should be some support from online food and retail sales, which businesses and consumers have increasingly pivoted towards. As at August 2021, online transactions accounted for about 14% of retail sales and 39% of F&B sales, up from 7% and 10% in Q4 2019. Consumer confidence is likely to pick up when there is more evidence that the rise in infections is not resulting in higher intensive care unit admissions sufficient to overtax the healthcare system. A more extensive reopening of the economy towards the end of this year should improve footfall for retail businesses and eateries. However, demand from foreign travellers is expected to recover only gradually.

The recovery of the travel-related cluster will be protracted

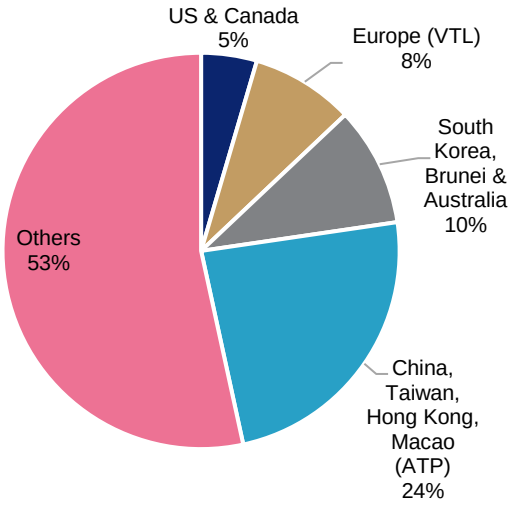
Some lifting of Singapore's border restrictions began in late Q3 2021. The recently announced Vaccinated Travel Lane (VTL)[4] arrangements, which permit quarantine-free travel, marks an important milestone towards the gradual normalisation of cross-border travel. Together with economies under the Air Travel Pass (ATP) scheme, they accounted for 47% of the 1.6 million average monthly short-term visitors to Singapore in 2019 prior to the pandemic **(Chart 2.10)**. Nevertheless, travel demand is not expected to return quickly or substantially in the near term. As at 25 October 2021, about 7,000 Vaccinated Travel Passes

[4] The VTLs have been extended to nine more countries in North America and Europe from 19 October, Switzerland and Australia from 8 November and South Korea from 15 November. This was in addition to those with Germany and Brunei implemented on 8 September. Short-term visitors from China, Taiwan, Hong Kong and Macao are also already allowed to enter Singapore via the Air Travel Pass (ATP) scheme.

have been issued to short-term visitors, making up less than 1% of monthly visitor arrivals pre-COVID.

Chart 2.10 Economies with travel arrangements with Singapore accounted for 47% of visitor arrivals pre-COVID

Visitor arrivals to Singapore, 2019



Source: STB, CAAS

Note: VTL and ATP arrangements announced as at 26 October 2021. Countries in Europe under the VTL scheme are Denmark, France, Germany, Italy, Netherlands, Spain, Switzerland and the UK.

The travel-related sector is accordingly expected to see a bumpy road to recovery, with the evolution of the COVID-19 pandemic remaining central. Currently, the US, Europe and Japan, which accounted for 20% of inbound tourist arrivals in 2019, have achieved average vaccination rates of about 65%. Vaccination rates in ASEAN-5 are only around 35%, and consequently tourist arrivals from these markets, which comprised about a third of visitors to Singapore in 2019, are expected to see slower recovery. Most tour operators in Singapore remain wary of prematurely scaling up operations and have continued to lean on domestic tourism. A stronger rebound in the travel-related sector may only materialise over the course of next year when border barriers are removed more substantially, and a recovery to pre-COVID output level is only anticipated after 2022.

Supply-side constraints are likely to persist in the construction sector

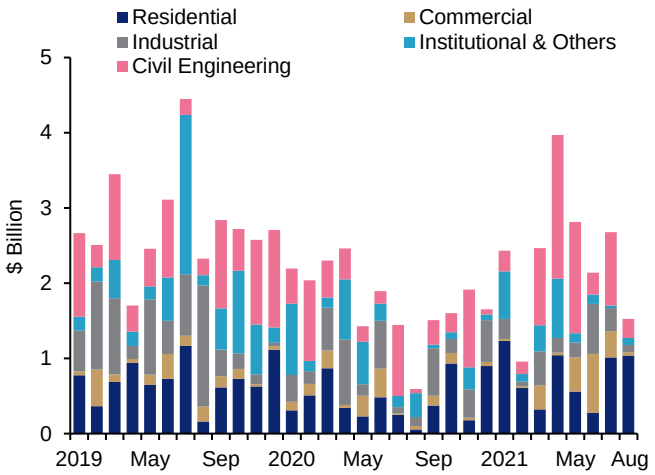
The recovery in the construction sector is expected to be hampered by elevated raw material costs and manpower shortages for the rest of the year. Moreover, safe management measures at worksites continue to hinder productivity, disrupting ongoing construction projects and preventing some companies from bidding for new contracts. While the Business Optimism Index compiled by the Singapore Commercial Credit Bureau (SCCB) showed that sentiment in the construction sector for Q4 had improved slightly, it remained largely depressed, with three out of six indicators, namely sales, net profit and inventory, signalling contraction.[5] Within the sector, outturns have been uneven—some listed firms chalked up

[5] The Business Optimism Index measures the net percentage of survey respondents expecting higher sales, profits, etc. (i.e. the share expecting increases minus the share expecting decreases), compared with the same quarter of the previous year.

profits in H1 while others continued to post losses. Beyond 2021, the easing of some supply-side constraints should support higher levels of construction activity given the strong pipeline of contracts awarded for projects, including for major public infrastructure works, public housing projects, healthcare facilities, and redevelopment of past en-bloc sites **(Chart 2.11)**.

Chart 2.11 The pipeline of contracts awarded since 2019 should support construction output beyond 2021

Contracts awarded



Source: BCA

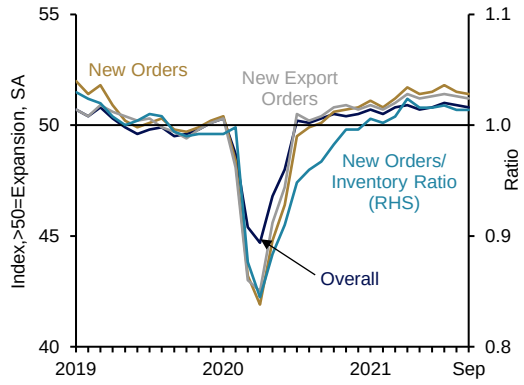
Trade partners' recoveries and strength in global electronics demand should continue to support the trade-related cluster

The outlook for the manufacturing sector remains bright. All sub-indicators of the SCCB's Business Optimism Index for Q4 2021 were in positive territory, underpinned by firm global demand. Singapore's manufacturing PMI also held up in September, with demand sub-indicators such as new orders and new export orders signalling expansion **(Chart 2.12)**. On the supply side, inventory has been built up at a slower rate in recent months, alongside rising input prices. Nevertheless, supply-side constraints do not appear to be binding, with the new orders to inventory ratio remaining close to historical levels.

Ongoing strength in the global electronics cycle supports the outlook for the trade-related cluster in the remainder of 2021 and 2022. Global chip sales continued to expand on a sequential basis in Jul–Aug, although at a slower pace than in previous quarters **(Chart 2.13)**. Global semiconductor investment will likely remain firm, underpinned by demand from 5G smartphone manufacturers, the automotive market, cloud services, and data centres. The tight supply situation should also ease gradually with more capacity coming on-stream as chipmakers expand and upgrade their facilities. In line with this outlook, Gartner, a business research firm, has upgraded its forecast for global semiconductor revenue growth to 26.9% for 2021 and is projecting growth of 8.9% for 2022. Semiconductor equipment manufacturers in Singapore have invested in new production capacity in anticipation that global demand will remain firm.

Chart 2.12 New orders to inventory ratio remained at close to historical levels

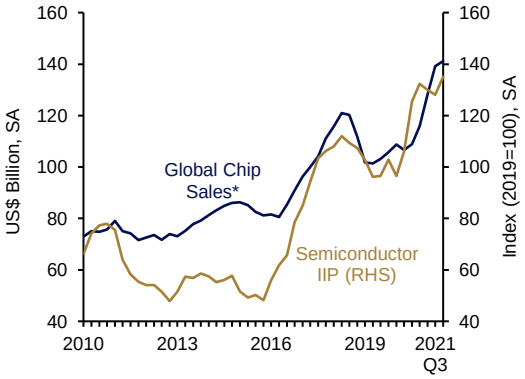
Manufacturing PMIs



Source: Singapore Institute of Purchasing and Materials Management (SIPMM)

Chart 2.13 Global chip sales continued to expand in Jul–Aug 2021

Global chip sales and Singapore's semiconductor IIP



Source: EDB, World Semiconductor Trade Statistics and Haver Analytics

Note: Q3 2021 is estimated based on Jul–Aug data.

Modern services are expected to be lifted by the broader economic recovery…

The anticipated pickup in domestic and regional economic activity in the coming quarters should benefit the banks and insurance segments. The former should be supported by more credit and fee-based banking services, while the latter is expected to see higher demand for general insurance from firms as they boost operations. However, the market for single-premium life insurance products could become increasingly saturated and dampen the recent strong momentum in the life insurance sub-segment.

The broader global economic recovery has raised the prospect of some removal of monetary policy accommodation by major central banks, which could interrupt the rally in global equities. Consequently, the fund management segment may see some softening in the near term, although funds' assets under management are expected to continue trending upwards on the back of growing wealth in the region. Meanwhile, the other sentiment-sensitive segments, such as forex and security dealing activities, could benefit from the potential rise in volatility and trading volumes brought about by market expectations of policy tightening.

While growth in the professional services sector has been sluggish over the past year, the outlook is expected to improve with the coming of VTL arrangements and easing of various public health restrictions. Exports of certain segments of professional services, such as business consultancy and head offices functions, should see some strengthening in the coming quarters as business travel gradually recovers.

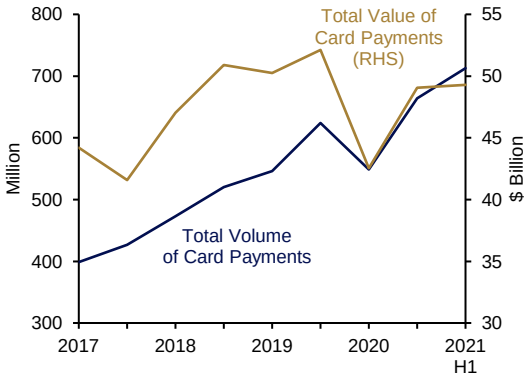
… with certain segments further buttressed by structural trends

In addition to the positive impulse from the cyclical upturn of the broader economy, the burgeoning of digitalisation, cloud computing and artificial intelligence (AI) is expected to support modern services growth in both the short and medium term. Within the finance & insurance sector, the other auxiliary activities segment—which mainly comprises payments processing players—is expected to continue to benefit from the ongoing shift to online

business platforms. According to payment transactions data, total card payments have rebounded strongly after declining in H1 2020 alongside the implementation of circuit breaker measures. In the same period, ATM transactions contracted and remained flat subsequently, which suggest a shift in consumer preferences for cashless payment modes that could become permanent **(Charts 2.14 and 2.15)**. The payments industry is also likely to benefit from the advancement of e-payments in other economies. For instance, PayPal recently announced its plans to increase its Singapore-based workforce by 25% over the next three years[6], in response to the growing demand for digital solutions in the region.

Chart 2.14 Total card payments rebounded after the decline in H1 2020…

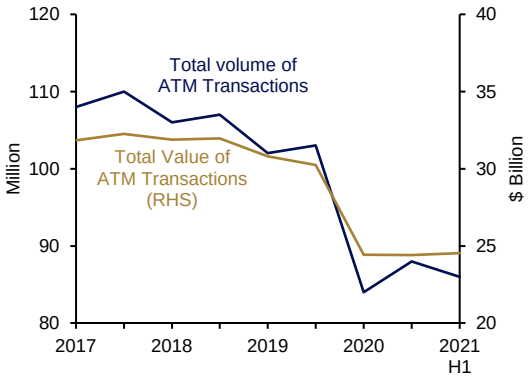
Total card payments transaction volumes and values



Source: MAS

Chart 2.15 … while ATM transactions remained flat

Transaction volumes and values at ATMs



Source: MAS

Similarly, the information & communications sector has continued to see demand from tech-related capex and has added headcount. For instance, in June 2021, the Singapore government announced $3.8 billion in ICT investments[7], a 10% increase from a year before, with the bulk of the projected spending going towards improving cloud infrastructure and developing AI applications for the public sector. Meanwhile, NCS has announced plans to hire up to 2,000 people over 2021 and 2022 in the areas of 5G mobile, AI and cloud computing, as part of its expansion plans in the Asia-Pacific region.[8]

6 Chia, O (2021), "PayPal to offer 150 new job openings to Singaporeans and PRs", *The Straits Times*, August 24.

7 GovTech (2021), "Increased ICT spending in FY2021 to accelerate Government digitalisation", June 23.

8 Chee, K (2021), "Local employment in infocomm media sector grew 5% in Singapore amid Covid-19", *The Straits Times*, July 8.

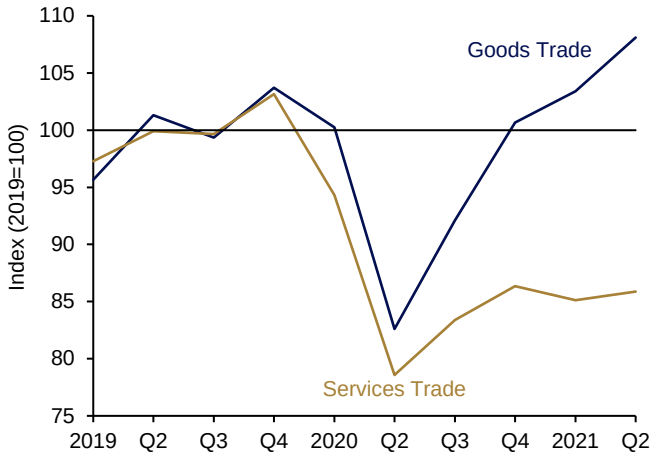
2.3 Impact of COVID-19 on Goods Trade in Singapore

Singapore's trade in goods was less affected by COVID-19 than that in services

The onset of COVID-19 led to a temporary sharp decline in global trade. As a very open economy, Singapore was not insulated from this shock, with trade in services bearing the brunt of the impact. Singapore's trade in goods was about 20% below its average 2019 levels at the trough in Q2 2020, but had returned to pre-COVID levels in Q4 last year **(Chart 2.16)**. Meanwhile, services trade has not risen substantially from the trough and was still about 15% below pre-pandemic levels as at Q2 2021, reflecting weakness in transport and travel services amid movement and border restrictions.

Chart 2.16 Singapore's goods trade has recovered faster than services trade

Exports and imports of Singapore's goods and services (NSA)



Source: DOS

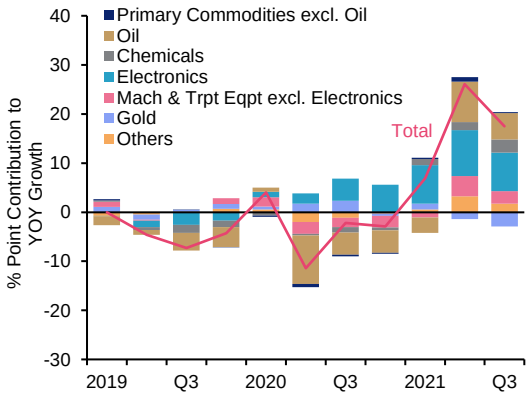
Goods trade was supported by strong global demand for electronics …

The resilience in Singapore's goods trade was part of a broader global picture of strong demand for goods relative to services amid the constraints of the pandemic. There was strong demand for electronics goods amid global lockdowns and the attendant switch to working from home and domestic leisure activities. Strong electronics trade flows were observed consistently throughout the pandemic. Singapore's electronics exports rose by 11% and imports by 13% in 2020 **(Charts 2.17 and 2.18)**. Trade in electronics has remained robust and a major driver of overall trade growth in 2021. Over Q1–Q3 2021, electronics exports expanded by around 25% and imports by 20%, compared to the same period a year ago.

Meanwhile, the boost to gold trade was more evident in the earlier part of the pandemic. Singapore's gold exports and imports surged by 32% and 38% respectively in 2020. The strength in demand for gold during this period may reflect its safe haven properties. Trade in gold has eased since the start of 2021 while gold prices have fallen, which may indicate a decline in demand for safe-haven assets amid global macroeconomic stabilisation.

Chart 2.17 Exports of electronics and gold surged in 2020

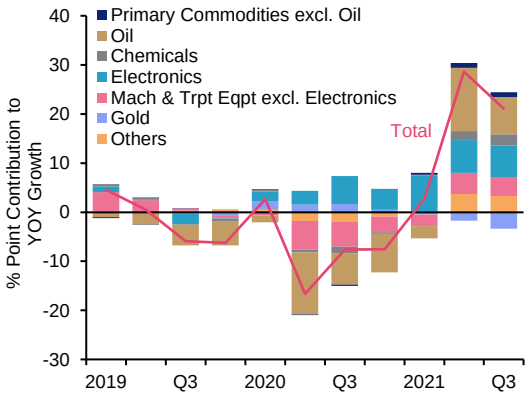
Exports by product type



Source: ESG and EPG, MAS estimates

Chart 2.18 Goods imports saw similar fluctuations as exports in the past year

Imports by product type



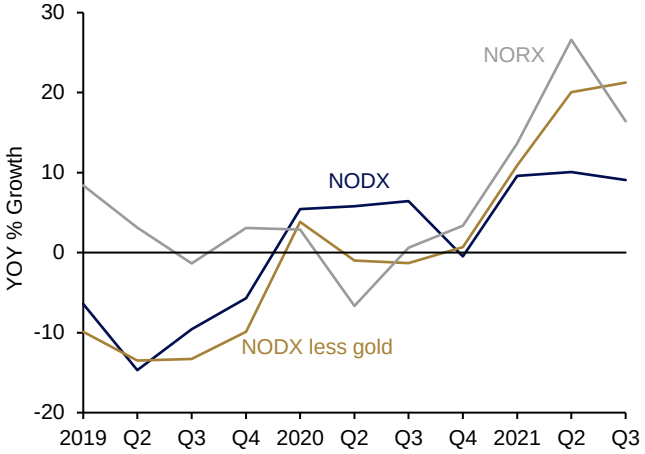
Source: ESG and EPG, MAS estimates

… and reflects Singapore's role as an entrepôt and a production node for the region

A sizeable part of Singapore's trade flows is due to re-exports, reflecting the country's role as an entrepôt. NORX accounted for 73% of Singapore's total non-oil imports and 62% of its non-oil exports in 2020. Despite some support from electronics trade, NORX growth was badly hit by the regional downturn in 2020, growing marginally by 0.1%, compared to the 4.3% growth in NODX. Both NORX and NODX have expanded strongly since the start of this year **(Chart 2.19)**. NORX grew by 19% y-o-y in the first three quarters of 2021, a faster pace than the 9.6% rate for NODX. Excluding gold, NODX chalked up a comparable double-digit growth of 17%.

Chart 2.19 NODX and NORX have recovered strongly in 2021

NODX and NORX

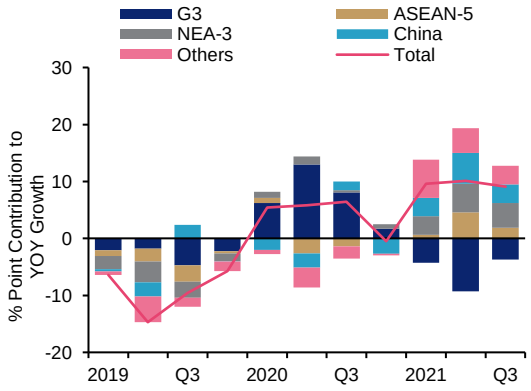


Source: ESG

The impact of the pandemic on trade flows has varied by destination. NODX to the G3 underpinned growth in 2020, even as NODX to China and ASEAN-5 contracted. This performance reversed in the first three quarters of 2021, in part because of base effects **(Chart 2.20)**. Meanwhile, NORX to the NEA-3 and China held up well during the pandemic **(Chart 2.21)**. NORX to ASEAN-5, which shrank for the most part of 2020, have rebounded since the start of this year, alongside stronger NORX growth to the NEA-3 and China.

Chart 2.20 G3 was the main contributor to NODX growth in 2020, while exports to the region provided strong support this year

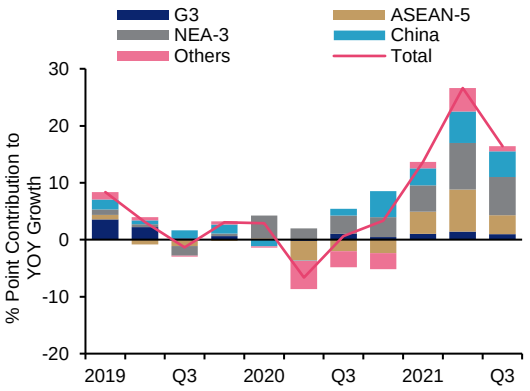
NODX by region



Source: ESG

Chart 2.21 NORX to ASEAN recovered in 2021

NORX by region



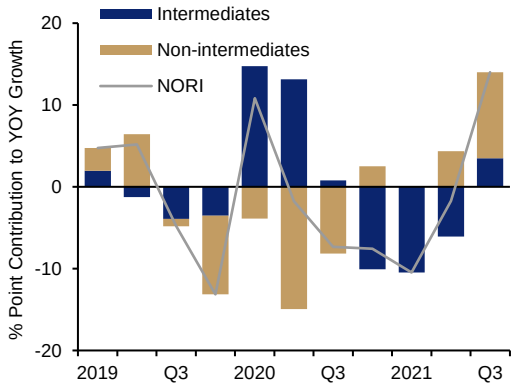
Source: ESG

Singapore's production is relatively upstream in nature and sources of imports of intermediate goods are well-diversified

The relatively resilient performance of Singapore's trade suggests that it has not been materially affected by the disruptions in global and regional supply chains during the pandemic. On the whole, domestic manufacturers have not been significantly affected by supply constraints thus far, although some firms have experienced intermittent delays in the shipments of raw material supplies and higher freight costs due to port congestions and a global shortage of vessels. Non-oil retained imports (NORI) fell by 1.5% in 2020 and 0.1% y-o-y in the first three quarters of 2021 **(Chart 2.22)**. NORI of intermediate goods posted robust growth in H1 2020 at the height of the pandemic, while NORI of non-intermediate goods, i.e., consumption and capital goods for final demand, have picked up in recent quarters **(Chart 2.22)**. The manufacturing PMI supplier's delivery time index for manufacturers in Singapore has been relatively stable, in contrast to the delays recorded in other Asian economies **(Chart 2.23)**.

Chart 2.22 NORI of intermediate goods expanded strongly in H1 2020 and the recent quarter

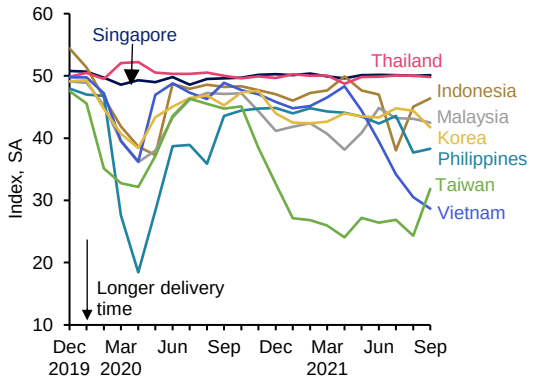
NORI of intermediate & non-intermediate goods



Source: ESG

Chart 2.23 Singapore's supplier delivery time has been relatively stable

Manufacturing PMI supplier's delivery time index



Source: SIPMM and Haver Analytics

Note: Index >50 denotes a decrease in delivery time, while index <50 denotes an increase in delivery time

There are two plausible reasons why Singapore has been less affected by global supply chain disruptions. On the production side, Singapore's manufacturing sector is more concentrated in "upstream" activities; for example, intermediate products accounted for about 80% of electronics exports. Production bottlenecks, which tend to culminate in the latter stages of the supply chain, are therefore less likely to occur. In addition, Singapore's sources of imports of intermediate goods are quite well-diversified, as shown by the Herfindahl-Hirschman (HH) index measuring the geographic concentration of sourcing **(Table 2.2)**. This suggests that a broader range of intermediate suppliers can be drawn upon in the event of a disruption. Although the HH score for intermediate electronics imports—which include semiconductors—shows a moderate degree of geographic concentration, those products account for a negligible share of Singapore's total retained imports of intermediate goods. The ongoing shortage of semiconductors should not significantly affect domestic manufacturing activity, as Singapore does not produce cars or other end-consumer electronics products that rely heavily on chips. On the consumption side, the HH index of geographic concentration risk for consumption goods imports also falls within the well-diversified range.

Table 2.2 Singapore's imports of intermediate and consumption goods are well-diversified

Herfindahl-Hirschman index of geographic concentration risk for Singapore's imports, 2020

Industry	Capital Goods	Intermediate Goods	Consumption Goods
All Goods	**1,884**	**917**	**887**
Electronics	3,311	2,176	2,630
Pharmaceuticals	-	1,892	785

Source: UN Comtrade and EPG, MAS estimates

Note: The HH Index is a commonly accepted measure of market concentration. In the table, it is computed by squaring the market share of each market that Singapore imports from and summing the resulting numbers. A HH index of less than 1,500 is generally considered geographically well-diversified, a value of 1,500 to 2,500 is moderately diversified, and an index of 2,500 or greater is deemed highly concentrated.

In sum, Singapore's goods trade has held up better than services trade during the COVID-19 pandemic. Strong global demand for electronics has benefitted Singapore's production and re-export activities. At the same time, the flow of essential goods and supplies for consumption and production appears to have been largely unimpaired, as Singapore benefits from diversification of supply, while strengthening trade networks and tapping opportunities in new markets.

Box A: The Digital Economy: A Potential New Engine for Productivity Growth[1]

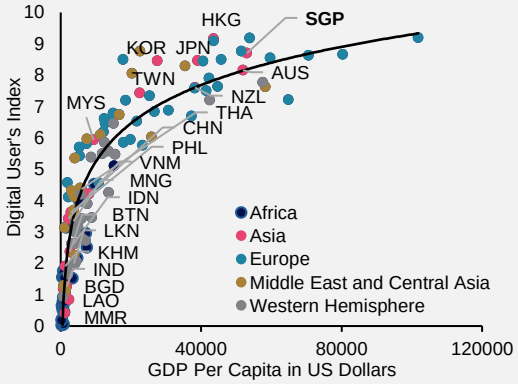
Introduction

Globally, the COVID-19 pandemic and associated safe distancing measures have accelerated the digital revolution. This dynamic is also taking place in Singapore, a country at the forefront of digital usage. An empirical analysis of sector-level labour productivity growth in advanced economies, including Singapore, suggests that digitalisation and innovation, captured through e-commerce, robotisation and research and development (R&D), are associated with higher labour productivity growth. Singapore has scope to expand e-commerce (despite recent rapid growth) and R&D. This would help the country reap more benefits of the digital economy, notably through higher productivity growth, and accelerate economic transformation.

The digital economy landscape in Singapore

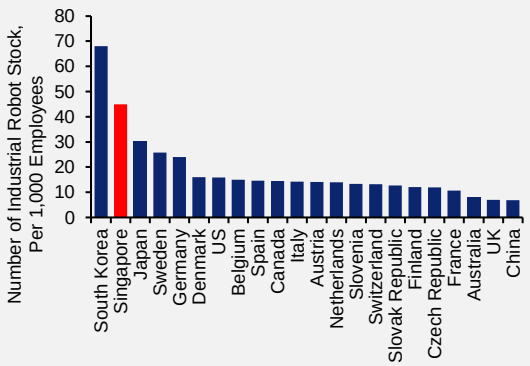
Singapore is at the forefront of digitalisation. The digital user's index, which captures various aspects of mobile and internet usage, highlights Singapore's high digital take-up compared to other Asian countries and among peer advanced economies **(Chart A1)**.[2] Singapore has also become one of the top global users of industrial robots, with its robot density increasing from about 1 operating robot per 1,000 employees in 2008 to 45 in 2018 **(Chart A2)**. Most of the industrial robots in Singapore are used in the semiconductor sub-sector, which accounted for 70% of all industrial robots in 2018.

Chart A1 GDP per capita and digital usage, 2016



Source: IMF World Economic Outlook and IMF staff calculations

Chart A2 Robot density in manufacturing, 2018 or latest available data



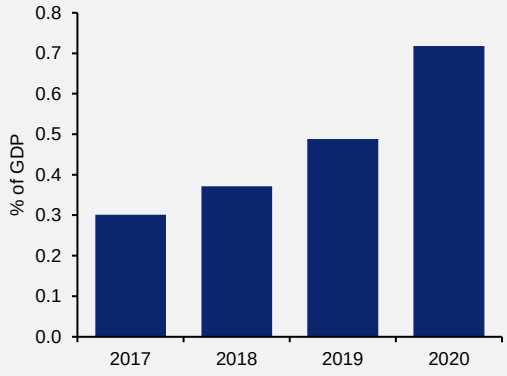
Source: International Federation of Robotics

[1] This Box was contributed by Tidiane Kinda with research assistance from Kaustubh Chahande, both from the IMF. It is based on Chapter III in the 2021 Article IV Consultation Staff Report. The views expressed in this Box are those of the author and do not necessarily represent the views of the IMF, its Executive Board, IMF management or MAS.

[2] The digital user's index in IMF (2018) averages six indicators: mobile phone subscriptions per 100 persons; percentage of individuals using the Internet; percentage of households with a personal computer; percentage of households with Internet access; fixed broadband Internet access in terms of subscriptions per 100 persons; and mobile-broadband subscriptions in terms of subscriptions per 100 persons.

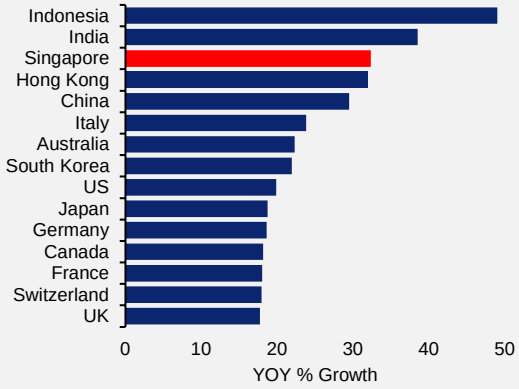
Singapore retains scope to expand e-commerce and R&D, two key elements of digitalisation. From about 0.3% of GDP in 2017, e-commerce sales more than doubled to about 0.7% of GDP in 2020 **(Chart A3)**. Boosted by social distancing during the pandemic, e-sales surged by 32% in 2020, one of the fastest growth rates among peers in Asia and advanced economies **(Chart A4)**.[3] Despite the rapid growth, e- sales in Singapore remained under 1% of GDP in 2020, well below the level in peer economies **(Chart A5)**. Yet, Singapore ranks among the countries with the highest readiness for e-commerce, measured by indicators that capture the use of secure internet services, the reliability of postal services for last mile delivery, and access to a financial account for payments **(Chart A6)**.

Chart A3 E-commerce sales in Singapore



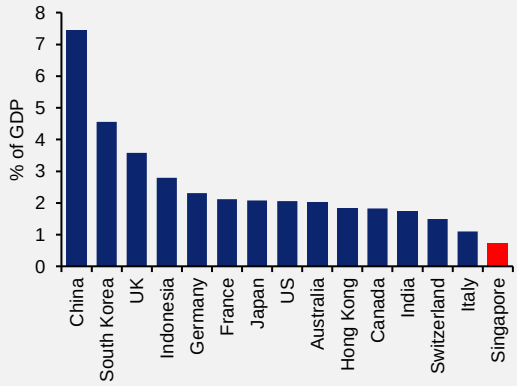
Source: Statista and IMF staff estimates

Chart A4 E-sales growth across economies, 2020



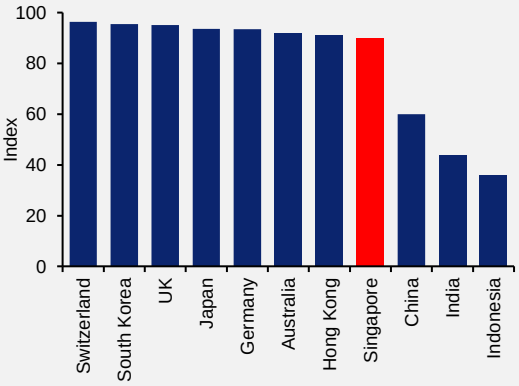
Source: Statista and IMF staff estimates

Chart A5 E-sales across selected economies, 2020



Source: Statista and IMF staff estimates

Chart A6 E-commerce Readiness Index



Source: United Nations Conference on Trade and Development B2C E-commerce Index[4]

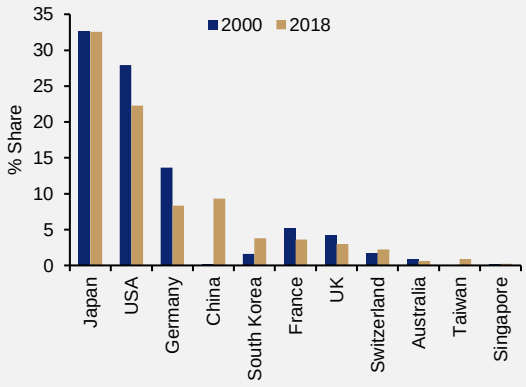
Singapore's share of all patent applications filed in Japan, Europe, and the United States ("triadic patent families") is low, mostly reflecting the country's smaller economy compared to peers **(Chart A7)**. Consistent with low patent filing, the increase in Singapore's R&D

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

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

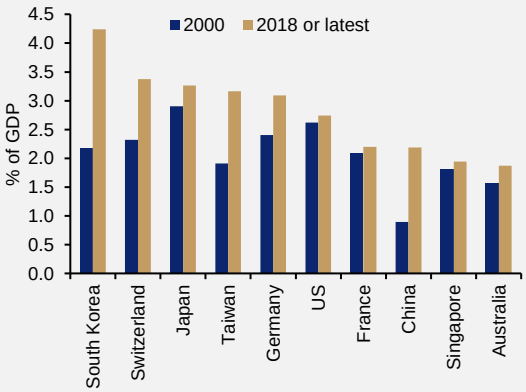
expenditure was modest from 2010 to 2018, contrasting with the rapid growth and higher spending levels in R&D observed in many economies such as South Korea, Switzerland, and Taiwan **(Chart A8)**. Nevertheless, Singapore's R&D expenditure of 1.9% of GDP in 2018 remained slightly higher than the median among OECD countries.

Chart A7 Share of patent applications in triadic patent families



Source: OECD statistics

Chart A8 R&D expenditure



Source: World Bank, OECD statistics and IMF staff calculations

Digitalisation, innovation, and productivity growth

The existing literature, while limited, suggests digitalisation and innovation may influence productivity growth. This finding is supported by emerging empirical evidence highlighting the positive role of digitalisation in fostering productivity.[5] For instance, Kinda (2019) shows that Asian firms engaged in e-commerce have on average 30% higher total factor productivity than other firms. Graetz and Michaels (2015) find that robots may have increased productivity growth by more than 15%.

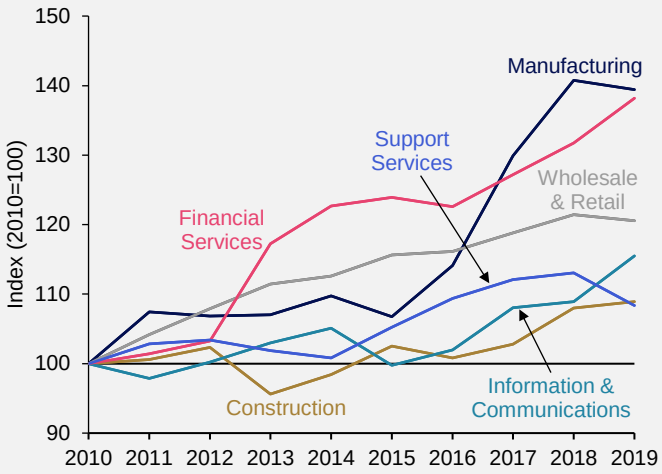
The analysis below draws on sector-level cross-country labour productivity data. Data on value added per worker by industry, a proxy for labour productivity, is from the OECD database and matched with data on Singapore from DOS. Data availability limits the sample to 22 advanced economies during 2000–19.[6]

Most services sectors in Singapore have seen relatively slow labour productivity growth in recent years, similar to trends in other advanced economies. While labour productivity growth in the manufacturing sector has been robust since 2015, service sectors, with the exception of financial services as well as information and communications, have experienced modest labour productivity growth during the same period **(Chart A9)**. More robust cross-country conditional correlations confirm that most service activities have had lower labour productivity growth compared to the manufacturing sector across the sample of advanced economies, including in Singapore.

[5] See Falk and Hagsten (2015), World Bank (2016) and Yang *et. al* (2017).

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

Chart A9 Singapore labour productivity by sector



Source: DOS, MOM, and IMF staff calculations

Note: Support services includes professional services, administrative & support services, and other services industries

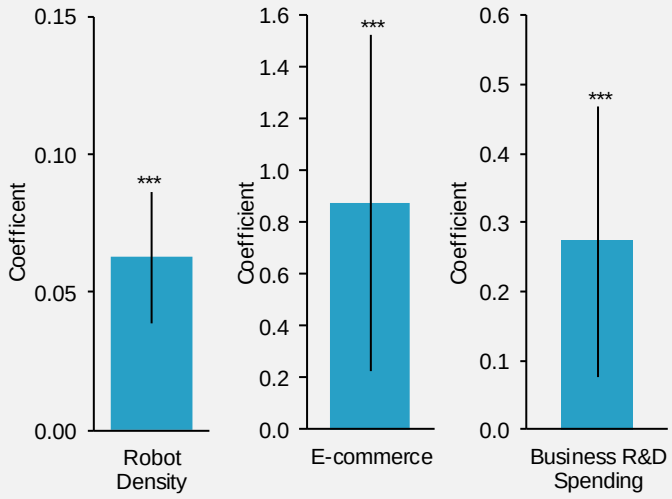
An empirical strategy can be used to investigate the potential role of digitalisation and innovation on labour productivity growth, through the following equation:

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

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

The results highlight that digitalisation and innovation are associated with higher labour productivity growth **(Chart A10 and Table A1)**. The baseline results show that overall, a larger share of e-commerce to GDP or a higher robot density are associated with higher labour productivity growth. Higher business R&D spending is also associated with higher labour productivity growth. These results are robust to a variety of tests. In addition, as the digital revolution is still unfolding, its impact on productivity may increase over time. However, the cross-country regressions show little evidence that the relationship between digitalisation and productivity growth has strengthened in recent years **(Table A2)**.

Chart A10 Estimated impact of digitalisation on labour productivity growth (% point)



Source: Author's estimates

Note: These figures illustrate coefficients and confidence intervals from three sector-level cross-country estimations of the potential effect of digitalisation and innovation on labour productivity growth controlling for sectoral inward FDI, openness to trade, and cross country-industry and time fixed effects. The error bars refer to the 95 percent confidence intervals around the estimated coefficients.
*** Statistically significant at the 1% level

Table A1 Cross-country baseline regressions

Dependent Variable: Labour Productivity Growth (5-year MA)	Specification		
	(1)	(2)	(3)
Robot density	0.063***		
	(0.012)		
E-commerce sales		0.876***	
		(0.329)	
R&D spending			0.272***
			(0.100)
Inward FDI	0.050***	0.020*	0.038***
	(0.007)	(0.011)	(0.010)
Trade openness	0.003	0.001	0.001
	(0.002)	(0.003)	(0.003)
Constant	4.119***	0.621	0.963
	(1.312)	(0.953)	(2.676)
Time fixed effects	Yes	Yes	Yes
Country and sector fixed effects	Yes	Yes	Yes
Observations	1,445	324	912
R^2	0.44	0.85	0.47

Note: Standard errors in parentheses.
* Statistically significant at the 10% level
** Statistically significant at the 5% level
*** Statistically significant at the 1% level

Table A2 Robustness check: possible structural change in digitalisation

Dependent Variable: Labour Productivity Growth (5-year MA)	Specification					
	All Years	Post-2015	All Years	Post-2017	All Years	Post-2015
	(1)	(2)	(3)	(4)	(5)	(6)
Robot density	0.063***	0.025**				
	(0.012)	(0.011)				
E-commerce sales			0.876***	0.706*		
			(0.329)	(0.390)		
R&D spending					0.272***	0.327**
					(0.100)	(0.140)
Inward FDI	0.050***	0.018**	0.020*	0.025*	0.038***	0.005
	(0.007)	(0.009)	(0.011)	(0.015)	(0.010)	(0.012)
Trade openness	0.003	−0.002	0.001	0.001	0.001	0.004
	(0.002)	(0.003)	(0.003)	(0.004)	(0.003)	(0.005)
Constant	4.119***	1.493**	0.621	1.021	0.963	0.965
	(1.312)	(0.740)	(0.953)	(1.136)	(2.676)	(1.274)
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country and sector fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,445	348	324	207	912	179
R^2	0.44	0.87	0.85	0.90	0.47	0.89

Note: Standard errors in parentheses.
* Statistically significant at the 10% level
** Statistically significant at the 5% level
*** Statistically significant at the 1% level

Implications of the results for Singapore: Fostering a smarter economic recovery post-pandemic

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

Singapore has introduced many initiatives to support digitalisation. For instance, the E-Commerce Booster Package supports retailers through a one-time support to defray 80% of qualifying costs to go online. The SME Go Digital programme supports SMEs' adoption and use of digital technologies through various channels, including foundational digital solutions for new SMEs (Start Digital Pack); guidance on digital solutions and training required for each development stage of a firm (Industry Digital Plan); provision of business-to-business and business-to-consumer e-commerce platforms to help firms reach global markets (Grow Digital); consultancy services to support firms' use of digital technologies (SME Digital Tech Hub); and pre-approved and proven SME-friendly solutions that can be adopted with the support of government grants such as the Productivity Solutions Grant (PSG). Singapore has

also launched programmes to accelerate the scale and speed of digital innovation (Open Innovation Platform).

While this Box focuses on opportunities for productivity growth that may be associated with the digital economy, policies to accelerate the digital transformation and reap its benefits should give due consideration to attendant challenges. These include labour displacement and a possible rise in inequality (Saadi Sedik and Yoo, 2021). This calls for complementary labour market policies, such as skills upgrading and training to address the distributional challenges associated with the digital revolution. Fortunately, Singapore is already at the forefront of designing such policies.

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3 Labour Market and Inflation

- The labour market recovery remains broadly on track, even as the heightened alert measures had some temporary dampening effects on the domestic-oriented sector in Q2 2021. Total employment contracted by 19,900 in the quarter, although resident employment continued to expand, albeit at a slower pace relative to Q1. However, non-resident employment declined at a faster pace due to tightened travel restrictions.

- While labour demand was weak in travel-related and consumer-facing segments, it rose strongly in most other sectors. Exacerbated by tight constraints in non-resident worker supply, manpower shortages have intensified in construction and manufacturing, and emerged in modern services and health & social services. Pockets of labour market tightness have contributed to rising wage pressures in aggregate, although higher wage growth thus far has largely reflected normalisation and base effects.

- For the rest of the year, resident employment should continue to expand alongside the economic recovery. In 2022, demand for resident and non-resident workers will rise as the economy expands at an above-trend pace. As labour market slack dissipates, wages are anticipated to strengthen over time.

- Core inflation rose to 1.1% y-o-y in Q3, from 0.7% in Q2. The step-up was mainly driven by the increase in electricity & gas costs, reflecting higher global oil prices. Labour cost increases also appear to have filtered through to consumer prices for some services such as food and domestic & household work. Reflecting higher core and accommodation inflation, CPI-All Items inflation edged up to 2.5% y-o-y in Q3, from 2.3% in Q2, even as private transport inflation moderated. Headline inflation is expected to come in at around 2% this year, while core inflation is projected to come in near the upper end of the 0–1% forecast range.

- Underlying inflation in the Singapore economy is expected to pick up further next year on the back of stronger domestic sources of inflation, including some administrative price revisions. Higher business costs, alongside recovering private consumption, will support the pickup in services inflation. Overall import price pressures could also persist into 2022 as global supply bottlenecks take time to ease. These factors are likely to dominate and underpin the rise in core inflation even if concerns over virus transmission lead to some near-term weakness in consumption. All in, MAS Core Inflation is forecast to rise to between 1–2% while CPI-All Items inflation is projected to average between 1.5–2.5% next year.

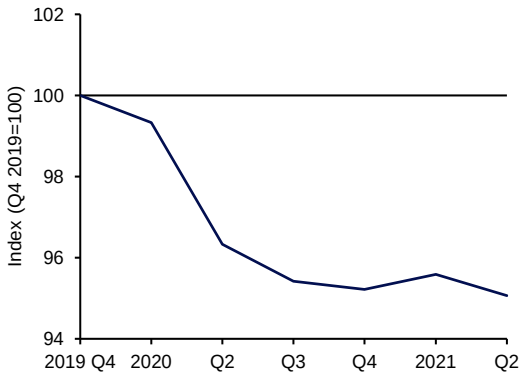
3.1 Labour Market[1]

Worsening COVID-19 community infections and the introduction of heightened alert measures slowed the labour market recovery in Q2

The heightened alert measures, imposed in response to rising COVID-19 infections, impacted the domestic labour market in Q2 2021. Total employment contracted by 19,900 q-o-q, after expanding 14,000 in the preceding quarter, bringing total employment down to 95% of its pre-COVID level in Q2 **(Chart 3.1)**.

Chart 3.1 Total employment contracted in Q2

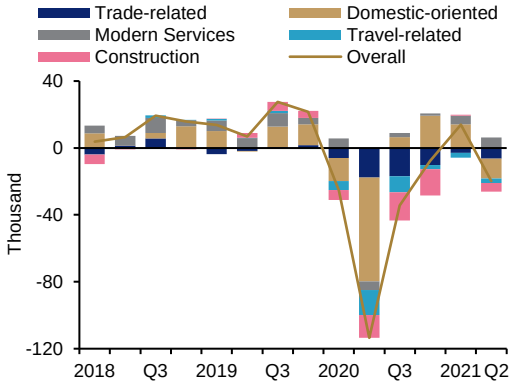
Total employment relative to pre-COVID level



Source: EPG, MAS estimates using data from MRSD, MOM

Chart 3.2 Most broad sectors saw a weakening in employment growth in Q2

Q-o-q employment change by broad sectors



Source: EPG, MAS estimates using data from MRSD, MOM

Most sectors saw employment outturns weaken during the quarter **(Chart 3.2)**. Employment fell in most segments within the domestic-oriented[2] sector, particularly in the consumer-facing segments such as F&B services and retail trade. Similarly, headcount in the travel-related sector declined further, albeit at a slower pace, as international travel remained restricted. The stricter border measures in Q2 also contributed to contractions in employment in the trade-related and construction sectors, as inflows of non-resident workers from higher-risk countries were curtailed.

In comparison, employment in the modern services sector bucked the trend to pick up more strongly in Q2, with firm labour demand in information & communications and professional services. The health & social services industry (within the domestic-oriented sector) also saw employment growth accelerate in Q2, amid a ramp up in national healthcare and vaccination capacities.

[1] The commentary in this section is mostly based on available labour market data up to Q2 2021.

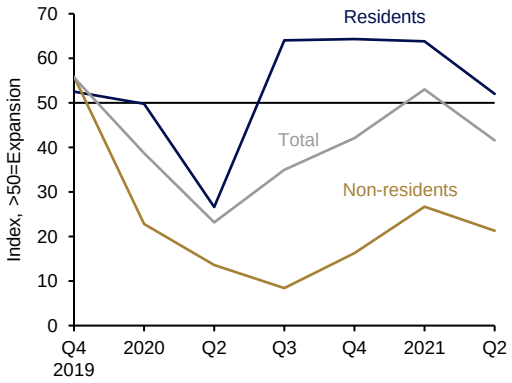
[2] The *domestic-oriented* sector encompasses land transport, retail trade, F&B services, real estate, administrative & support services, public administration & education, health & social services, other community, social & personal services, domestic work and utilities & others. The *travel-related* sector is made up of air transport, accommodation, as well as AER industries. The *trade-related* sector consists of manufacturing, wholesale trade, water transport and other transport industries. The *modern services* sector comprises information & communications, financial & insurance services and professional services.

Resident employment growth eased and non-resident employment recorded steeper declines

Resident employment continued to expand, although the increase slowed to 4,800 q-o-q in Q2 2021, from 23,700 in Q1. The slowdown in resident employment growth in part reflected the already significant absorption of overall labour market slack since the recovery began in Q3 last year, although demand for resident labour weakened in some sectors as well. In Q2, more sectors recorded a slowdown in resident employment growth or a contraction in resident headcount compared to the previous quarter. MOM's Employment Diffusion Index (EDI)[3] for residents, which provides an indication of the breadth of employment change, dipped to 52.0 from 63.8 in Q1 **(Chart 3.3)**.

Chart 3.3 A majority of industries saw contraction in employment in Q2

Employment diffusion index

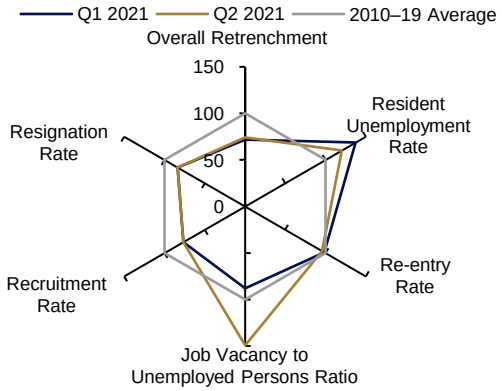


Source: MRSD, MOM

Note: Excludes migrant domestic workers.

Chart 3.4 Several labour market indicators worsened or ceased improving in Q2

Labour market indicators



Source: MRSD, MOM and EPG, MAS estimates

Note: All variables are indexed such that the 2010–19 historical average for each indicator takes a value of 100.

Meanwhile, the fall in non-resident employment accelerated to 24,700 q-o-q in Q2, from 9,700 in the preceding quarter. A broader set of industries saw contractions, as evident from the decline in the EDI to 21.3 in Q2 **(Chart 3.3)**. More stringent border restrictions from May, leading to a sharp drop in non-resident workers entering Singapore, was likely a key factor underlying the weaker employment outturns.[4] Nevertheless, the decline was mitigated by increased efforts to retain existing non-resident employees and to redeploy redundant workers to firms facing manpower shortages.[5]

3 MOM's EDI ranges from 0 to 100. The further above or below this index is from the midpoint of 50, the more or less widespread the employment expansions and contractions, respectively.

4 The significant impact of tighter border restrictions reflected the high numbers of COVID-19 infections and low vaccination rates in many of Singapore's key source countries for non-resident workers. Additional costs associated with testing and Stay-Home Notice requirements for incoming workers likely also dampened demand for them.

5 For instance, work permit holders (WPHs) in certain sectors whose permits are expiring this year will be allowed to renew their permits for up to two years even if they do not meet renewal criteria, such as those WPHs reaching maximum period of employment or maximum employment age.

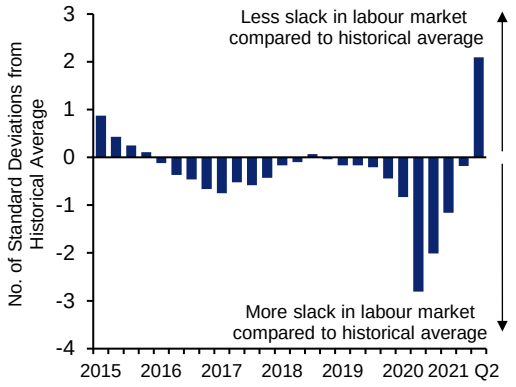
The recovery in the domestic labour market was temporarily interrupted in Q2

Following three consecutive quarters of diminishing labour market slack, several labour market indicators stopped improving or deteriorated slightly in Q2 2021 **(Chart 3.4)**. The total number of retrenchments edged up for the first time since Q3 last year. At the same time, the number of employees placed on short work-week or temporary layoff rose from the previous quarter. Residents' rate of re-entry into employment also weakened in Q2, suggesting that retrenched workers faced some difficulty in securing jobs during this period. Meanwhile, overall recruitment and resignation rates held steady in Q2 2021 but remained below the norm, indicating still relatively low levels of labour market confidence.

Conversely, the ratio of job vacancies to unemployed persons surged to 1.63 in Q2—the highest level since Q4 1997—as the seasonally adjusted number of job vacancies picked up to 92,100 in June, from 68,400 in March. The overall job vacancy rate also rose to its highest level in decades. Reflecting mainly these developments, EPG's Labour Market Pressure Indicator (LMPI) swung sharply to a high positive reading of 2.1 in Q2 from a small negative reading in Q1 **(Chart 3.5)**.[6]

Chart 3.5 High LMPI in Q2 overstated labour market tightness

Labour market pressure indicator

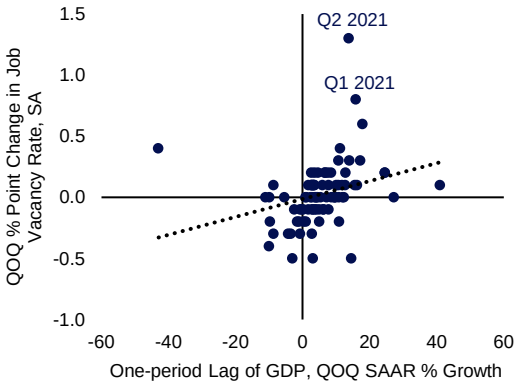


Source: EPG, MAS estimates

Note: Historical average period refers to Q1 2000 – Q4 2019.

Chart 3.6 The surge in job vacancy rate in Q2 mainly reflected restricted labour supply

Scatterplot of q-o-q change in seasonally adjusted job vacancy rate and one-period lag of GDP growth, Q1 2000 – Q2 2021



Source: EPG, MAS estimates using data from MRSD, MOM and DOS

Note: GDP growth is lagged by a quarter. The data labels shown in the chart are based on the job vacancy rate time period.

A labour supply crunch contributed to the surge in job vacancies, but underlying labour demand appears resilient

The surge in job vacancies in Q2 was primarily a supply-induced outcome, driven by sharply reduced inflows of non-resident workers. Indeed, the Annual Business Survey conducted by the Singapore Chinese Chamber of Commerce & Industry (SCCCI) in Jun–Aug 2021 found that close to 50% of respondents faced severe difficulties in hiring non-resident

[6] If the job vacancy indicators of the LMPI were kept unchanged from Q1 2021 levels, the LMPI would have shown a smaller positive reading of 1.2 in Q2 2021 (Q1 2021: −0.1). Other drivers of the positive LMPI reading in Q2 2021 were high y-o-y sectoral labour productivity growth and y-o-y unit labour cost growth, both of which reflected strong base effects. If both of these indicators were kept unchanged from their Q1 2021 values, Q2 2021 LMPI would be 0.3.

workers.[7] The job vacancy rate rose sharply in Q2 even as (lagged) GDP growth—a proxy for aggregate labour demand—eased, suggesting labour supply conditions tightened **(Chart 3.6)**.

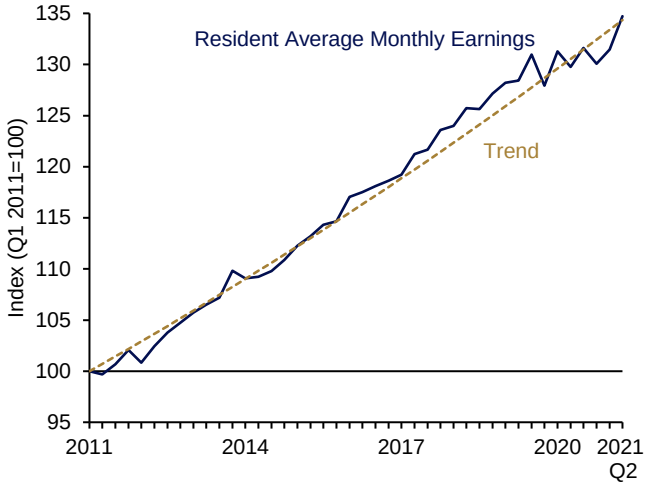
The high LMPI reading and job vacancy rate likely overstate the degree of overall labour market tightness in the economy to some extent. For instance, demand for labour likely eased in the domestic-oriented sector in Q2, as the heightened alert measures impacted activity. Meanwhile, the manufacturing and construction sectors, which typically do not rely heavily on resident workers for rank and file roles, accounted for slightly more than 40% of the additional job vacancies in June, compared to the pre-COVID average. The labour crunch in these sectors is unlikely to impart broad-based wage pressures to the economy. However, job vacancies grew in sectors such as modern services, public administration & education and health & social services. These sectors likely continued to be firm drivers of resident labour demand.

Resident wage levels returned to trend in Q2

Resident average monthly earnings rose by 3.8% y-o-y in Q2 2021, a significant step-up from the 0.2% recorded in the preceding quarter. The strong growth reflected base effects as well as the progress made in the labour market recovery to date. Firms across a range of industries were reported to have ended wage freezes and reversed wage cuts.[8] For the economy as a whole, the rise in average monthly earnings in Q2 brought the wage level back in line with its pre-COVID trend **(Chart 3.7)**.

Chart 3.7 Resident wage growth rose in Q2, bringing the wage level back to its pre-COVID trend

Average monthly earnings



Source: EPG, MAS estimates using data from CPFB and Haver Analytics

Note: The trend line is plotted using the average q-o-q SA wage growth from Q2 2011 – Q4 2019.

7 Subhani, O (2021), "SMEs urged to seek new opportunities, develop workforce to survive Covid-19", *The Straits Times*, September 15.

8 Tan, S (2021), "Firms in S'pore restore wages after pay cuts and freezes last year", *The Straits Times*, August 19.

Sectoral disparities in labour market outcomes have widened, with some mismatch in labour supply and demand across sectors

For the economy as a whole, labour market mismatch likely intensified in recent quarters. The heightened alert measures have weighed disproportionately on labour demand in several consumer-facing segments, including F&B services and retail trade, leading to rising retrenchments and more workers on short work-week or temporary layoff. In comparison, economic activity in sectors which were relatively unaffected by the heightened alert measures faced tightening labour supply due to a fall in the stock of non-resident workers and diminishing resident labour market slack. In Q2 and early Q3, the pockets of sectoral labour market slack that emerged were unlikely to have been readily absorbed by rising labour demand in the sectors facing labour supply constraints (e.g., as residents generally do not favour or have the experience to take on jobs in construction and manufacturing, where manpower shortages are most acute). Accordingly, the increasing sectoral labour market disparities and mismatch led, unusually, to an increase in the resident unemployment rate (from 3.5% in June to 3.7% in July) and a rise in job vacancy rates in Q2.

Resident employment growth is expected to pick up from Q2

The weakness in demand for resident workers in Q2 and early Q3 was likely temporary. Indeed, the easing of the resident unemployment rate to 3.6% in August suggests that labour market slack should continue to be absorbed. Forward-looking employment outlook surveys, including those by the ManpowerGroup and Singapore Commercial Credit Bureau (SCCB), indicate that firms intend to expand headcount, even as the degree of net hiring expected has eased somewhat in the latest readings **(Chart 3.8)**. The extension of restrictions limiting group sizes for social gatherings into November will weigh on employment growth in the consumer-facing segments to some extent, but demand for resident workers could increase towards the end of the year in line with year-end festivities. Moreover, constrained inflows of non-resident workers in the near term should encourage employers to pivot towards the hiring of resident workers, where possible. Hiring will also be bolstered by the Jobs Growth Incentive (JGI) which was recently extended to March 2022.[9]

In 2022, slack in the resident labour market will continue to dissipate and non-resident employment should begin to recover

Resident employment should continue to expand at a firm pace into 2022, although it is anticipated to slow from this year as resident labour slack is further absorbed. Non-resident employment is also expected to stabilise and then rise gradually as Singapore progressively shifts towards managing COVID-19 as an endemic norm, and as vaccination rates in the region improve, allowing more workers to enter. However, a significant setback on the path out of the pandemic or weaker-than-expected global growth could slow the pace of the domestic labour market recovery.

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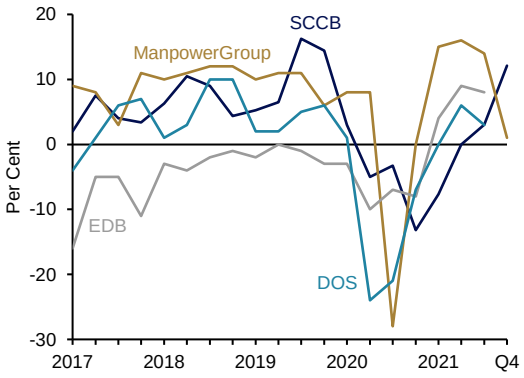
[9] Under Phase 3 of the JGI, from October 2021 to March 2022, the amount of support will be lowered. Firms will receive 15% wage support for the first $5,000 gross monthly wages paid to all new local hires below age 40 for up to 6 months. This is down from the 25% wage support for up to 12 months under Phase 2 of the JGI. For local hires aged 40 and above, persons with disabilities or ex-offenders, the level of JGI support under Phase 3 will be higher, at 50% for the first $6,000 gross monthly wages paid and for up to 12 months. This is tapered from the support period of up to 18 months under Phase 2 of the JGI.

Chart 3.8 Most firms intend to expand headcount but the employment outlook has deteriorated

Employment outlook for Singapore

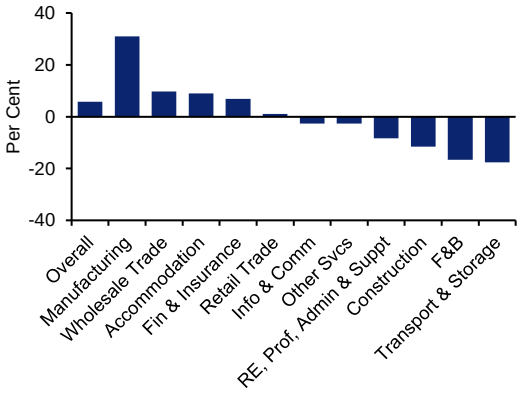


Source: DOS, EDB, ManpowerGroup and SCCB

Note: The net employment outlook refers to the percentage of surveyed employers expecting to increase headcount less the percentage of employers expecting to reduce employment during the period.

Chart 3.9 Labour productivity has exceeded pre-COVID levels in almost half of the sectors

Seasonally adjusted VA per worker in Q2 2021 compared to pre-COVID levels (Q4 2019)



Source: DOS and Haver Analytics

Note: 'RE' refers to real estate services.

From a sectoral perspective, the travel-related sector is likely to see a stronger restoration of labour demand in 2022 as international travel returns to some degree. Similarly, the domestic-oriented sector should see an employment boost from the continued normalisation of economic and social activities. Modern services will continue to contribute significantly to job creation next year, although job growth should moderate from the highs in 2021. In comparison, employment in the manufacturing sector could continue its structural decline as the sector seeks to improve productivity through the greater use of robots and automation in production. (For an analysis of the impact of the digital economy on Singapore's productivity growth, please refer to **Box A**.)

The overall level of employment, however, may not rise back to its pre-COVID level even by the end of 2022, in part because firms are expected to raise labour productivity, while demographic factors will continue to weigh on resident workforce growth. For instance, as a means of addressing manpower shortages, around 70% of the firms surveyed by the SCCCI have turned to automation or are digitalising their business processes.[10] Indeed, the economy's labour productivity level as at Q2 2021 was 5.7% higher than its pre-COVID level, mainly due to strong productivity growth in the manufacturing sector and in wholesale trade, accommodation and financial & insurance services **(Chart 3.9)**.

[10] Subhani, O (2021), "SMEs urged to seek new opportunities, develop workforce to survive Covid-19", *The Straits Times*, September 15.

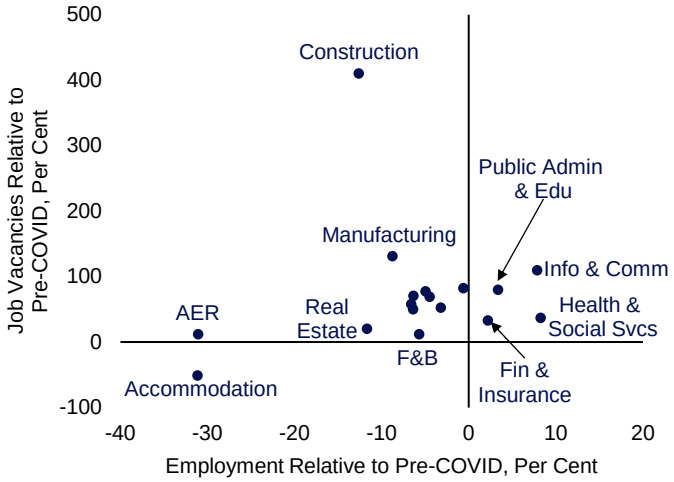
The resident unemployment rate is expected to decline to around its pre-COVID level next year, and wage growth is projected to rise

The resident unemployment rate is projected to edge down further and come close to its pre-COVID level some time in 2022. As the labour market tightens and business and worker confidence recovers alongside steady economic expansion, resident wage growth is anticipated to strengthen next year. Government policies aimed at improving the wage outcomes of lower-paid residents will also add slightly to overall wage growth in the economy. These policies include requiring firms that employ foreign workers to pay at least the Local Qualifying Salary to all resident workers, as well as the extension of the Progressive Wage Model to the retail sector, both of which will be effective from September 2022.

At the same time, some lingering mismatch is expected to put upward pressure on wage growth in pockets of the labour market. Demand for labour will likely continue to rise at a firm pace in sectors such as information & communications, health & social services and financial & insurance services. In these sectors, employment and job vacancies have both exceeded pre-COVID levels, suggesting tightening in labour market conditions **(Chart 3.10)**. There could also be higher non-resident wage costs for sectors where firms need to retain existing workers, such as in construction, manufacturing and domestic work.

Chart 3.10 The degree of mismatch in the labour market has increased

Scatterplot of job vacancies and employment levels as of June 2021, relative to pre-COVID levels (Q4 2019)



Source: EPG, MAS estimates using data from MRSD, MOM

3.2 Consumer Price Developments

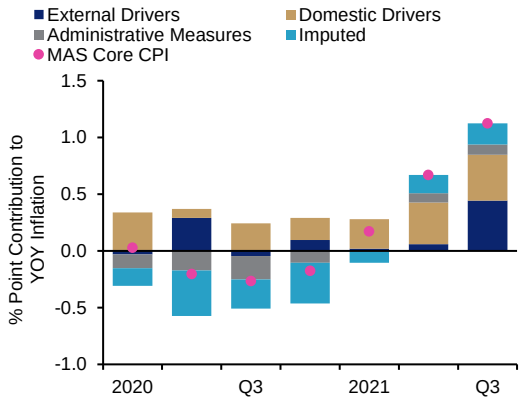
Core inflation rose in Q3, mainly due to external factors

MAS Core Inflation rose to 1.1% y-o-y in Q3, from 0.7% in Q2, as the externally-driven[11] components of the CPI stepped up discernibly **(Chart 3.11)**. In particular, electricity & gas costs increased sharply as global oil prices rose above the pre-pandemic (Q4 2019) level. At the same time, higher imported food prices, following the acceleration in global food inflation in preceding quarters, passed through to stronger non-cooked food inflation. On the domestic front, rising wage costs were likely reflected in some consumer services prices, keeping domestic drivers of inflation firm.

Higher core inflation, alongside a larger increase in accommodation costs, drove CPI-All Items inflation up to 2.5% y-o-y in Q3, from 2.3% in Q2 **(Chart 3.12)**. Rents across all housing types continued to rise, lifting accommodation inflation to 1.7% in Q3, from 0.9% in Q2. Meanwhile, further increases in global oil prices in Q3 fed through to higher petrol costs, although this was more than offset by the slower pace of increase in car prices and the road tax rebates that were introduced in August.[12]

Chart 3.11 Externally-driven CPI components contributed most to the increase in core inflation

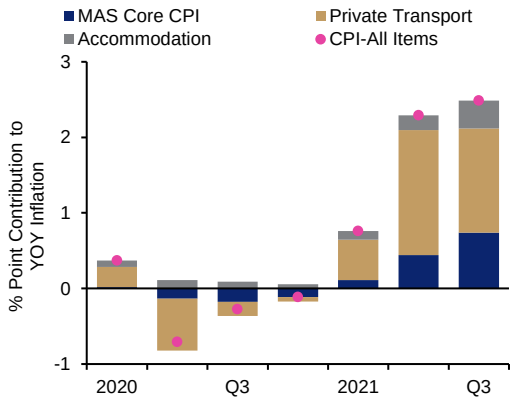
Y-o-y contribution to MAS Core Inflation



Source: DOS and EPG, MAS estimates

Chart 3.12 Headline inflation rose in line with higher core and accommodation inflation

Y-o-y contribution to CPI-All Items inflation



Source: DOS and EPG, MAS estimates

[11] *Externally-driven* components of the CPI (15% of the core CPI basket) mainly refer to non-cooked food and electricity & gas as these items are heavily influenced by imported prices. *Domestically-driven* components (58%) consist of most discretionary services as well as retail & other goods, which are estimated to be mainly affected by domestic demand and cost conditions. *Administered* CPI components (18%) refer to those whose prices are significantly affected by government policies such as public education and healthcare services. Lastly, *imputed components* (9%) refer to holiday expenses and airfares which remain mostly imputed due to limited international travel.

[12] Road tax rebates were provided for petrol and petrol-hybrid vehicles for one year from 1 August 2021 to 31 July 2022 as part of government measures to ease the transition towards higher petrol excise duties.

Amid global supply-side constraints, higher imported prices have driven up consumer prices

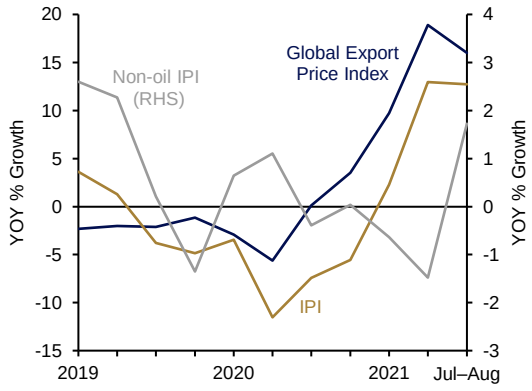
Brent crude oil prices rose from US$61 per barrel in Q1, to US$69 per barrel in Q2, or 9% above the pre-COVID (Q4 2019) level. Global oil inventories were drawn down as OPEC and its allies (OPEC+) kept supply additions modest even as world oil consumption was increasing strongly. The pickup in crude oil prices in Q2 led to upward revisions in domestic electricity and gas tariffs for Q3, and as a result, the electricity & gas component of the CPI rose sharply by 9.8% y-o-y in Q3.

Meanwhile, global demand for a range of consumer goods such as home electronics and automobiles has been strong. At the same time, bottlenecks in global production and logistics have persisted and prices of intermediate inputs such as semiconductors, as well as transportation costs, have risen considerably. The Freightos Baltic Global Container Index, for example, was approximately seven times above its Q4 2019 level as at end-September. Coupled with higher input costs, the hikes in freight charges have caused global export prices to pick up significantly **(Chart 3.13)**.

Mirroring the rise in the global export price index, Singapore's import price index (IPI) increased in Q1 and rose more sharply in Q2. While higher oil prices contributed most to the pickup in import prices in H1, rising costs of non-oil imported components started to drive overall imported inflation in Jul–Aug. The increase in non-oil import prices was fairly broad-based in Jul–Aug **(Chart 3.14)**. Imported costs for a range of consumer items such as handbags & leather products and household durables rose. Strong domestic demand for these items, in turn, facilitated the pass-through of higher costs to consumer prices. However, on the whole, retail goods inflation in Singapore remained contained. Prices of retail & other goods fell by 1.0% y-o-y in Q3, a slight moderation from the 1.2% fall in Q2, as continued declines in prices of items such as personal care products and clothing reflected persistent weakness in demand.

Chart 3.13 Domestic import prices picked up alongside stronger global export price pressures

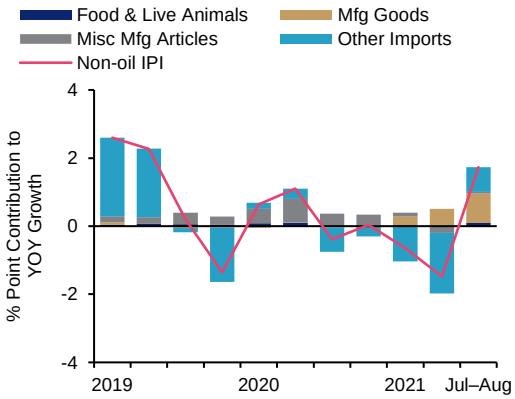
Global export price and Singapore IPI



Source: CPB World Trade Monitor and DOS

Chart 3.14 Non-oil import prices picked up across various components

Y-o-y contribution to non-oil IPI growth



Source: DOS and EPG, MAS estimates

Global food commodity prices have risen steadily in the past few quarters, and as at Q3, were 33% above their pre-COVID (2019) level. Adverse weather conditions in global corn and soybean growing regions have lifted prices of animal feed, resulting in record high production costs for livestock such as poultry in Malaysia.[13] In tandem, Singapore's imported food inflation began to pick up towards the end of Q2 and rose to 2.7% y-o-y in Jul–Aug, reflecting stronger price increases for several foodstuffs including dairy products and meat. In line with the step-up in imported food inflation, non-cooked food CPI rose by 1.2% in Q3, compared to 0.4% in the preceding quarter.

Tighter domestic labour supply constraints have led to rising business cost pressures

Meanwhile, domestic drivers of inflation also firmed in Q3 2021. For instance, domestic & household services costs rose by 2.2% y-o-y, extending the 1.4% increase in Q2, partly on account of higher salaries for migrant domestic workers (MDWs). Salaries of MDWs have reportedly risen significantly since border measures curtailed most of the inflow of these workers.[14] New COVID-related costs incurred in the recruitment of incoming MDWs were likely a factor contributing to the increase in domestic & household services costs as well.

Labour shortages also appear to be emerging in the F&B services sector, which have led to cost-push pressures on the CPI. The sector is reportedly offering higher pay to attract and retain workers.[15] Stronger wage cost pressures, alongside higher non-cooked food prices, were likely the key drivers causing food services inflation to increase to 1.5% y-o-y in Q3, from 1.2% in the preceding quarter. The larger price increases were broad-based across restaurant, hawker centres and fast food outlets in Q3, despite the decline in average F&B sales volume in Jul–Aug given the restrictions on dining-in.

Price pressures have broadened in the economy

The proportion of core CPI items experiencing price increases above their historical average rates rose to 43% in Q3, from 33% in H1 2021 **(Chart 3.15)**. Alternative measures of underlying inflation in the Singapore economy, including the 25% and 15% trimmed mean inflation measures[16], also increased further on a y-o-y basis in Q3 **(Chart 3.16)**. The 25% symmetric trimmed mean inflation, for example, picked up to 1.3% y-o-y in Q3, from 0.9% in Q2.

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13 Tan, A, and Lim, M Z (2021), "Chicken prices could increase in Singapore, fuelled by rising feed costs in Malaysia", *The Straits Times*, September 15.

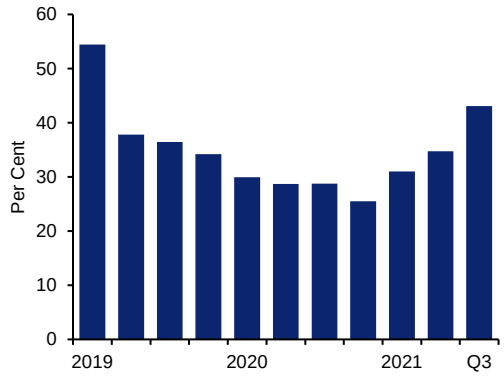
14 Salaries of transfer helpers have risen to $800–$1,000 from $650–$800 before the pandemic. Ang, P, and Wong, Y (2021), "First group of 100 maids to arrive in S'pore in August under pilot scheme amid Covid-19", *The Straits Times*, July 15.

15 Yang, C (2021), "Singapore F&B outlets struggle to hire despite offering higher pay", *The Straits Times*, July 13.

16 The trimmed mean inflation measures are calculated by excluding a certain percentage of the largest and smallest weighted price changes in the components of the index (i.e., the most volatile CPI components). The 25% symmetric trimmed mean measure removes 25% of price changes at both ends of the distribution.

Chart 3.15 A larger proportion of core CPI recorded inflation above their historical averages

Weighted proportion of MAS Core CPI with inflation above historical average

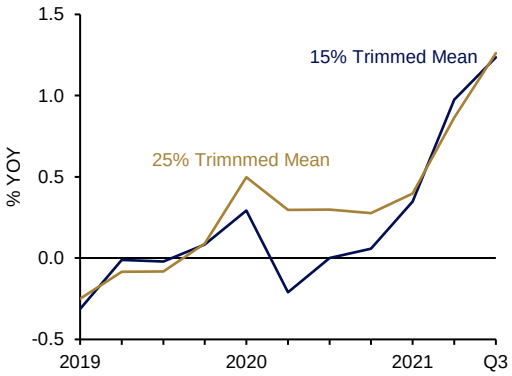


Source: EPG, MAS estimates

Note: The proportion is calculated by taking the sum of weights of core CPI items that experienced price increases above the 2015–19 average over the sum of weights of all core CPI items, excluding goods and services that were newly introduced in the 2019-based CPI.

Chart 3.16 Other measures of underlying inflation also point to rising price pressures

Trimmed mean inflation



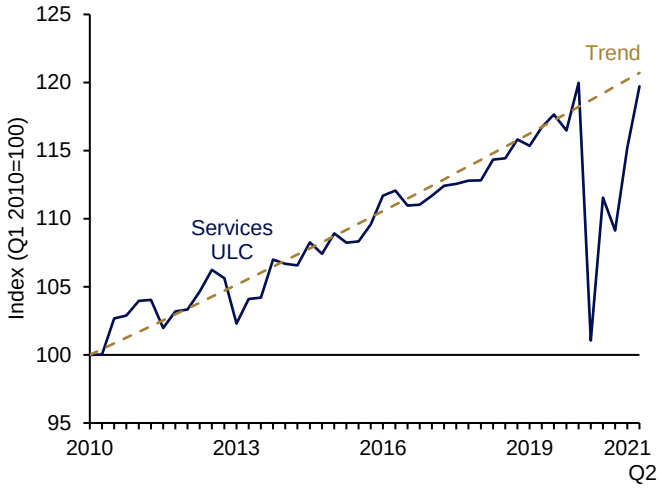
Source: EPG, MAS estimates

A normalisation in business costs and administrative services components is expected to support the increase in core inflation

Business cost pressures have remained relatively contained to date, but should pick up further next year as government support measures taper and factor market slack declines. Indeed, most of the broad-based wage support for businesses had already ceased in Q3. Services ULC rose by 18.3% y-o-y in Q2 amid the waning of government wage subsidies and the pickup in resident wage growth **(Chart 3.17)**. Wage growth in the period ahead is expected to remain firm, which would support a rise in services ULC to its pre-COVID trend level by year-end and its steady upward trajectory thereafter, broadly in line with its long-term rate of increase. These stronger labour cost pressures are expected to drive a pickup in inflation in most core CPI components in 2022, with a greater impact on discretionary services, including food services.

Chart 3.17 Services ULC is projected to return to its pre-COVID trend level by end-2021

ULC for services producing industries



Source: DOS and EPG, MAS estimates

Note: The trend ULC line is plotted using the average q-o-q SA ULC growth from Q1 2010 – Q4 2019.

Some administrative services are also projected to resume fee increases next year as the economy returns to a firmer footing. Public transport fares could be raised, as the maximum allowable fare adjustment quantum of 4.4% from the previous fare review will be rolled over to the upcoming iteration.[17] On the education front, lower fee caps for preschool education significantly reduced fees this year.[18] The disinflationary effect of this structural measure should fade by January 2022, normalising education services inflation next year. Contingent on the pandemic situation locally, existing outpatient subsidies under the Public Health Preparedness Clinic scheme could also be gradually phased out, which would result in rising healthcare inflation next year.

17 Public Transport Council (2020), "2020 Fare Review Exercise", September 4.

18 Fee caps for childcare and infant care partner operators were reduced for the new 5-year term starting from January 2021.

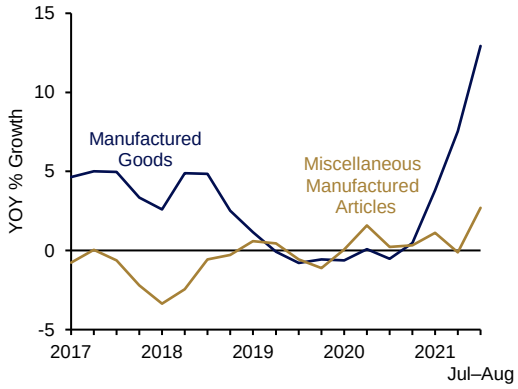
External CPI components should continue to contribute to the increase in core inflation in 2022, as import price pressures are likely to persist …

Disruptions to global food production and consumer goods supply chains will likely take some time to resolve. COVID-19 containment measures are expected to remain in place in some countries until vaccination rates rise, which in some cases may be early 2022. Inflated freight and delivery costs, as well as material costs, that have weighed on firms' margins could be passed through to final consumer prices in the coming year, especially if demand conditions stay resilient **(Chart 3.18)**. For instance, reports suggest semiconductor chip shortages are anticipated to last for at least another year, which could lead to prices of consumer electronics remaining firm.[19]

While global food inflation slowed slightly in Q3, the ongoing logistics crunch could continue to exert cost-push pressures on food prices. The World Bank expects food commodity prices to rise by 26.1% this year, well above the 2010–19 historical average of −0.8%.[20] Against this backdrop, Singapore's imported food price inflation is expected to increase further in the coming months, in turn lifting non-cooked food CPI inflation **(Chart 3.19)**.

Chart 3.18 Import prices of goods could pick up further in the near term

IPI of selected goods

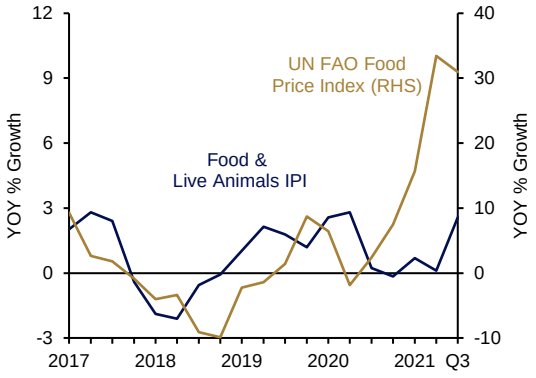


Source: DOS and EPG, MAS estimates

Note: The IPI for Miscellaneous Manufactured Articles exclude selected subcomponents that are less relevant to the CPI.

Chart 3.19 Non-cooked food inflation ticked up in Q3 amid sustained increases in global prices

Global food price index and Singapore's IPI for food & live animals



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

Note: The last datapoint for IPI refers to the average y-o-y change in Jul–Aug 2021.

[19] The Straits Times (2021), "Increasing chip costs could lead to more expensive phones and PCs in 2022", September 12.

[20] World Bank (2021), "Commodity Markets Outlook October 2021".

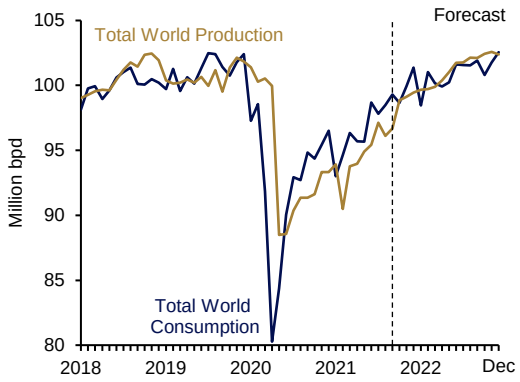
… but energy-related CPI items are expected to make a smaller contribution as oil prices average around 2021 levels

Brent crude oil prices increased further to US$73 per barrel in Q3 and averaged more than US$80 per barrel since early October on supply-side concerns, including the OPEC+ decision on 4 October to maintain the same magnitude of output increases.[21] In the near term, the increase in demand for crude oil is expected to continue outpacing supply growth, especially in light of the ongoing rally in natural gas prices.[22] Crude oil prices are projected to remain elevated at around current levels in Q4, before easing in 2022, assuming a stronger pickup in global oil production next year led by an unwinding of production cuts by OPEC+ and an increase in non-OPEC output **(Charts 3.20 and 3.21)**. Given that full year average oil prices are forecast to remain similar in 2021 and 2022, the contribution of energy-related CPI to the increase in core and headline inflation is expected to recede in 2022.

However, there remain upside risks to crude oil prices in the near term. The recent surge in gas prices amid a supply crunch could persist and in turn contribute to stronger-than-expected increases in oil prices. The projected easing in crude oil prices over the course of next year is also largely dependent on supply conditions which are heavily influenced by the production decisions of OPEC+.

Chart 3.20 Global oil supply is projected to pick up to match the increase in global consumption

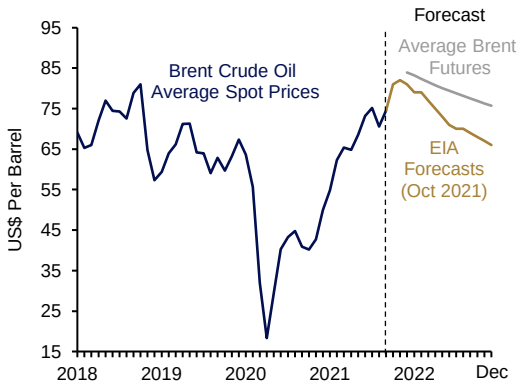
Brent crude oil production and consumption



Source: US Energy Information Administration (EIA)

Chart 3.21 Brent prices are expected to average around similar levels in 2021 and 2022

Brent crude oil prices and forecasts



Source: Bloomberg and EIA

Note: Brent futures prices were averaged over the working days from 5 to 25 October 2021.

[21] Lawler, A, Ghaddar, A, and Astakhova, O (2021), "OPEC+ sticks to plan for gradual oil output hike, price roars higher", *Reuters*, October 5.

[22] With spot natural gas prices more than doubling since April, some countries switched to oil-fired power generation, further raising demand for global crude oil.

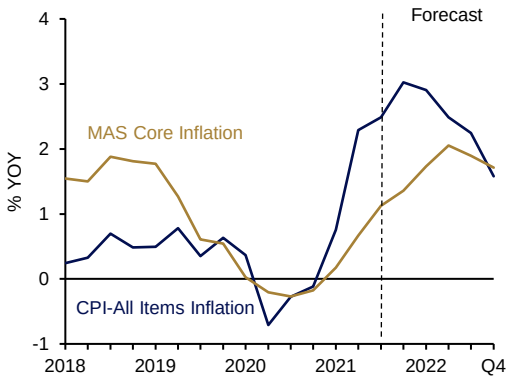
All in, core inflation is forecast to rise steadily, underpinned by strengthening domestic and imported costs

In the quarters ahead, base effects associated with the rebound in prices from their lows a year ago will fade. However, rising imported and labour costs will lead to a strengthening of underlying inflation in the Singapore economy. As the domestic economy reopens and private consumption picks up, these accumulating business costs will be passed through to consumer price inflation. Inflation rates of various CPI components that have thus far been quiescent, such as those associated with administrative measures, are also expected to normalise gradually, and support a generalised strengthening in the economy's price pressures.

All in, core inflation is expected to come in near the upper end of the 0–1% forecast range this year and rise to 1–2% in 2022. Meanwhile, CPI-All Items inflation is projected to come in around 2% this year and average 1.5–2.5% in 2022.

Chart 3.22 Core inflation is expected to rise steadily

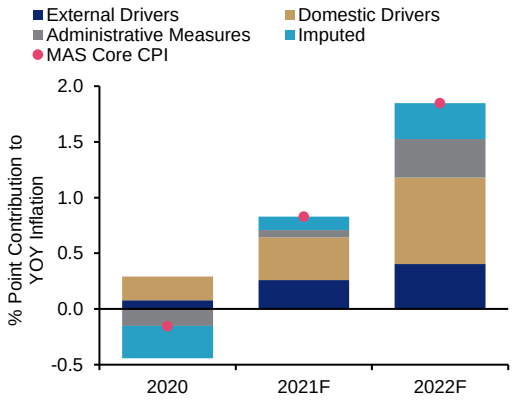
MAS Core Inflation and CPI-All Items inflation forecasts



Source: DOS and EPG, MAS estimates

Chart 3.23 Domestic services components are anticipated to drive the increase in core inflation

Y-o-y contribution to MAS Core Inflation



Source: DOS and EPG, MAS estimates

4 Macroeconomic Policy

- In October 2021, MAS raised the slope of the S$NEER policy band slightly. Restoring an appreciation path for the exchange rate was appropriate against the underlying pressures on inflation. Import price increases are likely to continue for some time, while business costs in the Singapore economy should firm as the negative output gap closes in 2022.

- Fiscal policy continued to provide the necessary support to the economy as the COVID-19 pandemic evolved. Amid disruptions to economic activity caused by several waves of the more contagious Delta variant, quick and targeted fiscal assistance was rendered to businesses and individuals that were hard-hit by the tightened safe management measures.

- All in, fiscal and monetary policies continue to work in tandem to mitigate the economic impact of the pandemic and secure medium-term price stability.

4.1 Monetary Policy

In April 2021, MAS kept the slope of the S$NEER policy band at 0%

At the time of the April 2021 policy review, global growth prospects had improved on the back of rising inoculation rates and additional fiscal policy stimulus in a number of economies. With activity likely to be boosted in the externally-oriented sector, Singapore's GDP growth was projected to exceed 6% in 2021. Nevertheless, shortfalls in output would persist in the sectors worst-hit by the pandemic, such as the travel-related sector and the consumer-facing industries. The overall output gap was expected to narrow but remain negative for the year as a whole. Moreover, downside risks to growth remained, including the possible emergence of more virulent COVID-19 strains.

MAS Core Inflation had turned positive in y-o-y terms in Q1, but most of the increase reflected fading disinflationary effects from government subsidies that were introduced early last year as well as higher imputed costs of travel-related components.[1] Labour demand was projected to improve alongside the economic expansion and reopening, but some slack would persist due to job mismatches and underemployment. At the same time, persistent negative output gaps in some of Singapore's trading partners would keep imported inflationary pressures contained. All in, core inflation would rise from subdued levels, but remain below 1% over 2021. MAS therefore maintained a zero per cent rate of appreciation of the S$NEER policy band in the April Monetary Policy Statement (MPS).

[1] Amid limited international travel, travel-related components such as holiday expenses and airfares were imputed by applying the price direction of other sub-indices in the CPI-All Items index, in line with international practice. As CPI-All Items inflation rose in Q1 2021—reflecting a strong pickup in the cost of private transport—the CPI inflation for imputed services increased mechanically.

While global growth momentum slowed over the past six months, Singapore's recovery remains intact

Since the April *Review*, the recovery in the global economy has slowed with the spread of the COVID-19 Delta variant worldwide. The resurgence in infections in many economies has weighed on the demand for consumer-facing services. Meanwhile, manufacturing and logistics supply chains were afflicted by the waves of infections across the world, with factories and ports confronted by shortages of intermediate inputs and intermittent production stoppages. These bottlenecks caused considerable delays in the delivery of final goods orders. With the spread of the Delta variant dampening services consumption as well as disrupting global supply chains, world GDP is expected to grow by 5.6% this year, down from the 6.2% expected in April.

The Delta variant made its way to Singapore in early Q2 and has likewise caused significant increases in community infections over the last six months. In response, the Multi-Ministry Taskforce imposed several restrictions to provide time to raise the national vaccination rate and protect domestic healthcare capacity.

These developments had a dampening effect on Singapore's growth momentum in Q2 and Q3 but did not fundamentally derail its underlying recovery path. In the third quarter, GDP recorded a mild sequential increase, underpinned by the expansion in the modern services sector. Meanwhile output in the manufacturing sector stabilised, after having contracted in the preceding quarter. The pace of GDP growth in Q1 was also revised up. As at Q3 2021, real GDP had risen by 16% from its pandemic-induced trough in Q2 2020 and regained its pre-pandemic (Q4 2019) level. Singapore's GDP remains on track to grow by 6–7% this year, despite the weaker outturn for the global economy.

The Singapore economy should expand at an above-trend pace in 2022

Globally, infections could crest in the period ahead as naturally-acquired and vaccine-induced levels of immunity continue to rise. The link between infections and weakness in economic activity has also loosened. As more economies ease social restrictions and reopen their borders, global spending, incomes and production should see a steady increase. Shortages and frictions in global value chains and international shipping are likely to linger but should unwind over 2022, thereby gradually easing supply constraints on growth. Overall, global economic growth should also become more broad-based as the main drivers shift from the advanced economies, where the recovery has matured, to the emerging economies where the level of activity is still catching up to pre-pandemic levels. World GDP growth is expected to moderate, to 4.8% next year, but remain above trend, supporting a further narrowing of the negative output gap.

Against this backdrop, global demand and production levels should remain firm in 2022. The resilient electronics up-cycle, in particular, will drive further expansion in Singapore's manufacturing sector. Improving business and consumer activity in the region should also underpin steady growth in the modern services sector domestically. Meanwhile, key enablers[2] of the transition towards managing COVID-19 as an endemic norm are progressively being put in place, which should allow more activity in the consumer-facing industries to resume across the country. Accordingly, private consumption should strengthen as sentiment improves. With border restrictions progressively relaxed through the introduction of

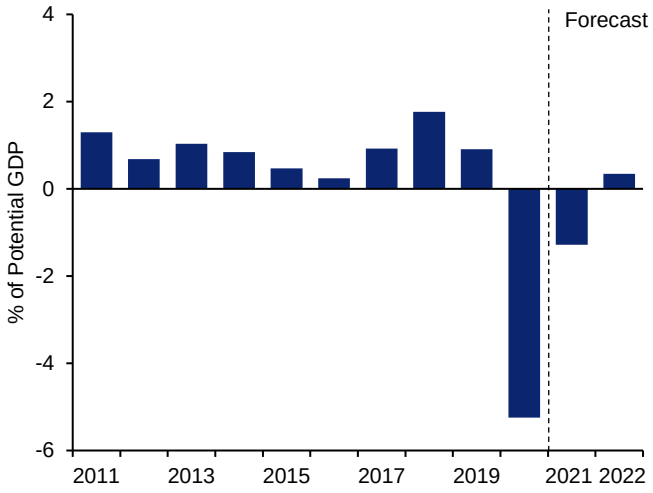
[2] These include vaccination rates that are on track to rise well beyond 80%, improving access to rapid tests, as well as additional healthcare capacity and the home recovery programme.

vaccinated travel lanes, a normalisation in foreign visitor and worker inflows should also support a gradual pickup in the travel-related and construction sectors.

Barring major shocks, such as the emergence of a vaccine-resistant strain of virus or severe economic or financial stresses in the global economy, the Singapore economy should expand at an above-trend pace next year. The large negative output gap that had opened in 2020 and narrowed significantly in 2021 is expected to become modestly positive in 2022 **(Chart 4.1)**.

Chart 4.1 The negative output gap in Singapore's economy has narrowed this year and is expected to become modestly positive in 2022

Output gap



Source: EPG, MAS estimates

Core inflation is expected to rise further in 2022 amid growing domestic and imported cost pressures

The ongoing recovery in the labour market was temporarily dampened by tighter COVID-19 restrictions in Q2 and early Q3. The resident unemployment rate recorded its first increase in July since September 2020, as hiring, particularly in the consumer-facing sector, weakened during the Heightened Alert period in Apr–May. In Q2, resident employment growth eased while the number of retrenchments and workers placed on short work-week or temporary layoff ticked up. At the same time, the more stringent border restrictions imposed from April curtailed the inflow of non-resident workers, exacerbating the labour crunch in some sectors such as construction, and contributing to a nascent labour shortage in others.

In the event, the unemployment rate declined anew in August. Underlying labour demand appears to be resilient, as businesses look past the temporary COVID-19 measures, and face difficulties in the hiring of new non-resident workers from abroad. The emerging non-resident labour supply crunch amid the border restrictions has likely begun contributing to stronger wage pressures in a range of labour-intensive segments of the economy, such as in domestic & household and food services. As the Singapore economy gradually reopens in the coming quarters, labour market slack is expected to diminish and support a pickup in the pace of wage growth in 2022. Measures to raise the incomes of lower-wage residents from September 2022 will also add slightly to the rate of wage increases.

Meanwhile, external inflationary pressures are expected to remain firm, reflecting both recovering global demand and lingering supply constraints. Some upside risks to the baseline forecast remain. Oil prices have risen by a further 27% since April, while global food prices have also increased well above their pre-pandemic levels. Import costs of a range of consumer goods are also likely to remain elevated, and could rise further over the near term. As negative output gaps in most of Singapore's trading partners are expected to narrow, albeit by varying degrees over 2022, underlying global inflation is likely to rise.

The nascent wage and imported inflationary pressures have already contributed to a broadening of above-historical inflation across CPI components in Q3 2021. MAS Core Inflation stepped up to 1.1% y-o-y in Q3 from an average of 0.4% in Q1–Q2 2021, alongside other measures of underlying inflation in the economy. In the quarters ahead, as private consumption improves and confidence increases, the pass-through of accumulated wage and import costs to consumer prices is expected to pick up. Core inflation is forecast to rise steadily, as inflation rates across a range of services components begin to normalise.

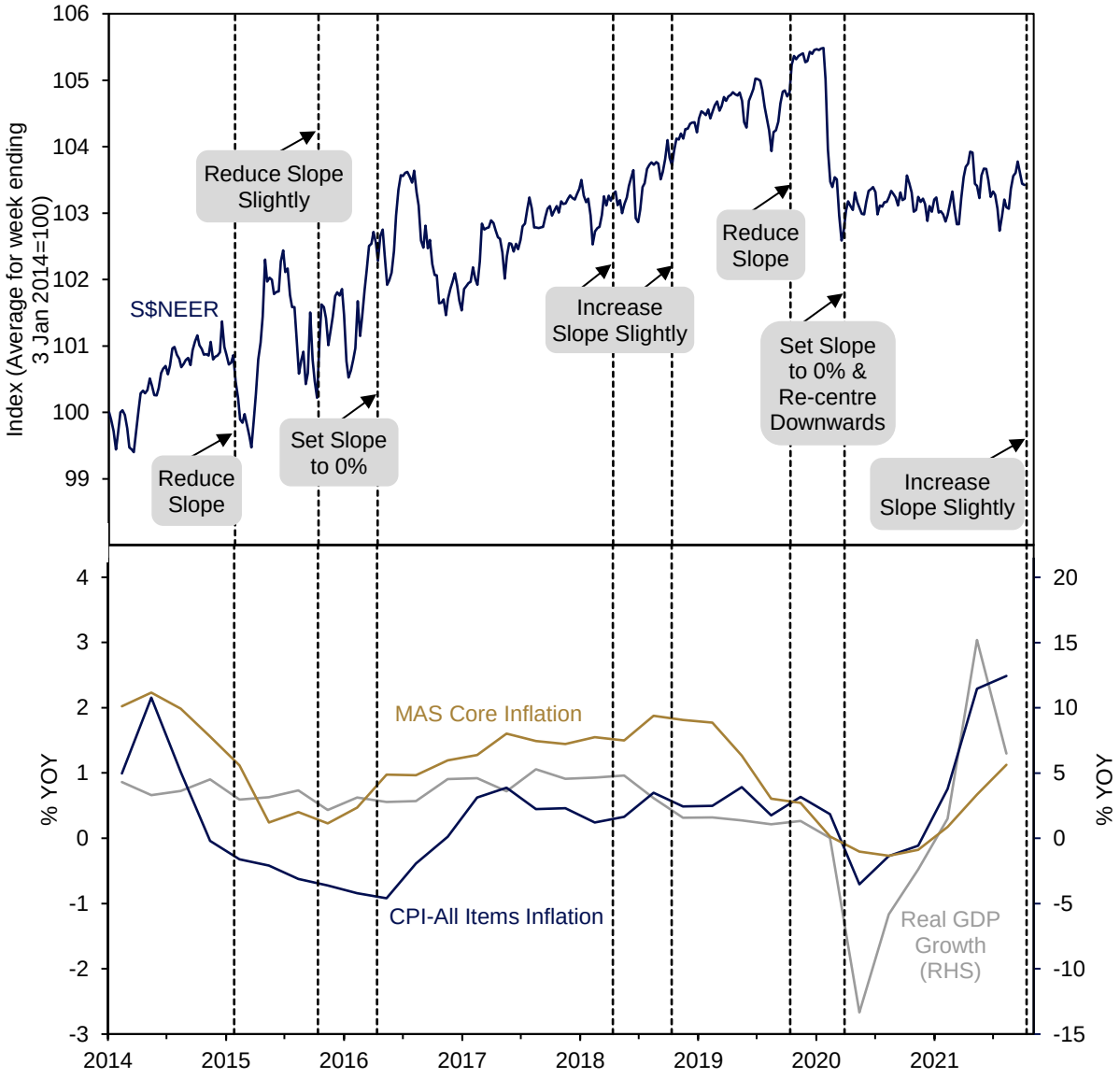
Overall, core inflation is expected to come in near the upper end of the 0–1% official forecast range for this year as a whole and rise further to an average of 1–2% in 2022.

In October 2021, MAS raised the slope of the S$NEER policy band slightly

Against the backdrop of a recovery of Singapore's GDP to its pre-pandemic level as well as a broadening of sustained core inflationary pressures, MAS raised the slope of the S$NEER policy band slightly in the October 2021 MPS. The width of the policy band and the level at which it was centred were left unchanged. This measured adjustment to the policy stance will help ensure medium-term price stability, while recognising the risks to the recovery. **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.

The S$NEER fluctuated in tandem with the evolution of the pandemic and relative economic prospects

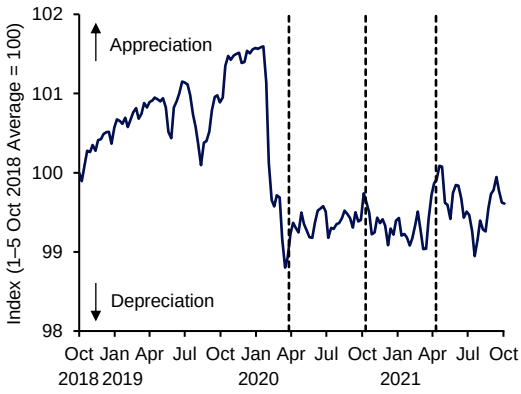
Over the past six months, the S$NEER broadly fluctuated above the midpoint of the policy band **(Chart 4.3)**, reflecting in part shifting sentiments around Singapore's macroeconomic outlook as the pandemic evolved. Shortly after the April MPS, the S$NEER faced strong appreciation pressures, owing to a robust GDP outturn in Q1 and stronger-than-expected inflation. However, the upward pressures waned and the S$NEER weakened over May–Jul as the emergence of new waves of domestic COVID-19 infections led to a reimposition of public health measures locally. The S$NEER then appreciated steadily between Aug–Sep as the

outlook for the Singapore economy appeared brighter compared to the rest of the region, in part due to its rapid progress on vaccinations.

In all, the S$NEER has depreciated modestly, as the S$ weakened against currencies such as the Chinese renminbi and US dollar. Financial markets had generally became more optimistic about the prospects of the Chinese and US economies, even as the Singapore government tightened domestic restrictions in light of the renewed increase in domestic infections. This depreciation outweighed the strengthening of the S$ against currencies of economies such as Australia and the Eurozone, where there have been larger outbreaks of COVID-19 infections or where vaccination rates are lower **(Chart 4.4)**.

Chart 4.3 The S$NEER broadly fluctuated above the midpoint of the policy band

S$NEER, weekly average

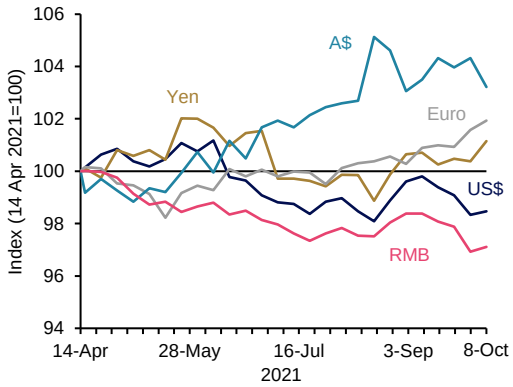


Source: EPG, MAS estimates

Note: Vertical dashed lines indicate the last three releases of the MPS.

Chart 4.4 Pandemic outturns and relative economic prospects drove FX movements

Bilateral exchange rates, weekly average



Source: EPG, MAS estimates

Short-term US interest rates have eased slightly over the last six months, with the 3-month US$ LIBOR declining to 0.13% as of September, from 0.18% in April. The US$ Overnight Index Swap (OIS)-LIBOR spread narrowed further since April, reflecting easy US dollar funding conditions. Financial markets welcomed the US Federal Reserve's decision in June to extend the temporary US dollar liquidity swap lines established with a number of foreign central banks, including MAS, to December 2021 from September previously.

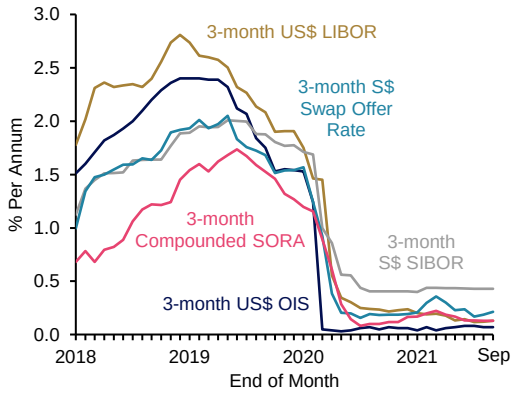
In tandem, domestic interest rates edged down slightly over last six months. The 3-month S$ SIBOR, compounded Singapore Overnight Rate (SORA) and S$ Swap Offer Rate declined slightly from April and remained close to their all-time lows **(Chart 4.5)**.

Changes in the Domestic Liquidity Indicator (DLI)[3] were largely driven by developments in the S$NEER over this period as the movements in domestic interest rates were marginal. Singapore's monetary conditions, as proxied by the DLI, tightened in Q2 as the level of the S$NEER was, on average, slightly higher than a quarter ago. However, the DLI eased significantly in July, owing to the weakening of the S$NEER, before tightening once more in September as the S$NEER gradually appreciated **(Chart 4.6)**.

3 The DLI captures movements in the S$NEER and the 3-month S$ SIBOR.

Chart 4.5 Interest rates edged down closer to their all-time lows

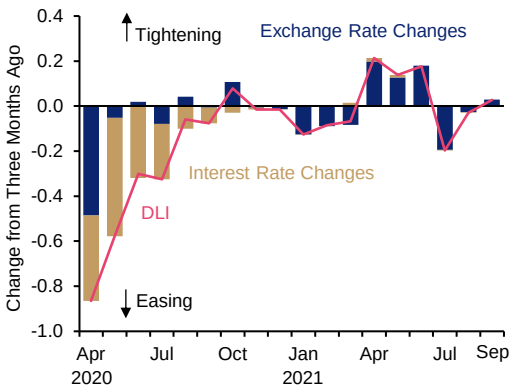
US$ and S$ interest rates, end of month



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

Chart 4.6 Monetary conditions have tightened in recent months due to S$NEER appreciation

DLI and components



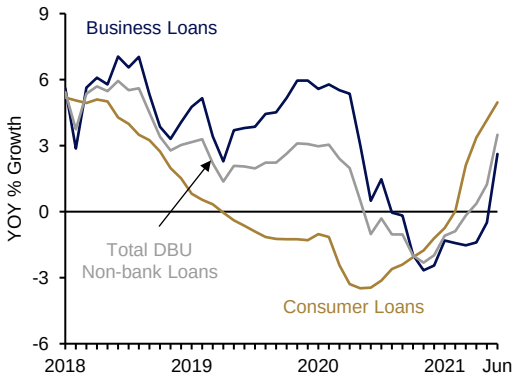
Source: ABS Benchmarks Administration Co Pte Ltd and EPG, MAS estimates

Credit growth recovered significantly from its trough last year

Alongside the recovery in the domestic economy, credit growth turned positive on a y-o-y basis in April 2021.[4] Consumer loans recovered faster than business loans as growth of the former turned positive in February, while that of the latter only registered its first y-o-y expansion in June, underpinned mainly by loans to the general commerce sector **(Charts 4.7 and 4.8)**.

Chart 4.7 Credit growth recovered significantly as economic activities resumed

Outstanding stock of DBU non-bank loans

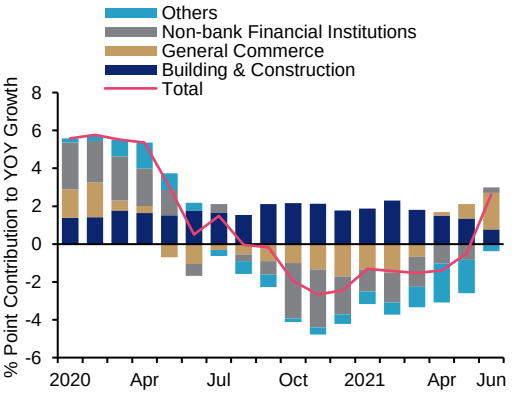


Source: MAS

Note: Data till June 2021 due to changes to the statistics reported in MAS' Monthly Statistical Bulletin.

Chart 4.8 Demand for credit recovered across most sectors

Outstanding stock of DBU non-bank loans by sector



Source: MAS

Note: Data till June 2021 due to changes to the statistics reported in MAS' Monthly Statistical Bulletin.

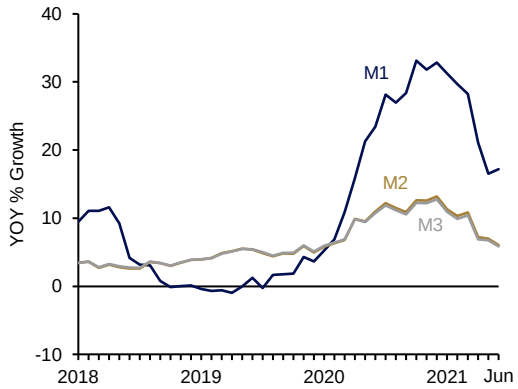
[4] On 1 July 2021, two major changes in MAS' banking sector regulatory framework took effect.This led to changes in the way data is reported by financial institutions, and consequently, to changes to the statistics reported in MAS' Monthly Statistical Bulletin, including data on loans, monetary aggregates, and their sub-components. The data reported in this issue of the *Review* has been compiled on the previous basis, and terminates in June 2021. For more information, please refer to MAS' note on "Updates to the Monthly Statistical Bulletin".

Money supply growth slowed sharply while the velocity of money picked up

Despite the pickup in credit growth, the pace of expansion in money supply slowed significantly in H1 2021, in part reflecting the tapering of the extent of fiscal support and transfers provided. M1 growth decreased to 17% y-o-y in June 2021 from its peak of 33% in October 2020 **(Chart 4.9)**. The slowdown was mainly driven by a sharp fall in the growth of demand deposits. Similarly, growth in the broader monetary aggregates, M2 and M3, moderated **(Chart 4.10)**.

Chart 4.9 Money supply growth slowed down significantly this year

Monetary aggregates

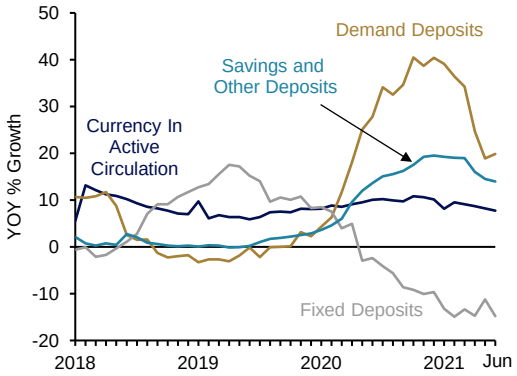


Source: MAS

Note: Data till June 2021 due to changes to the statistics reported in MAS' Monthly Statistical Bulletin.

Chart 4.10 The slowdown in growth was mostly driven by demand deposits

Components of money supply



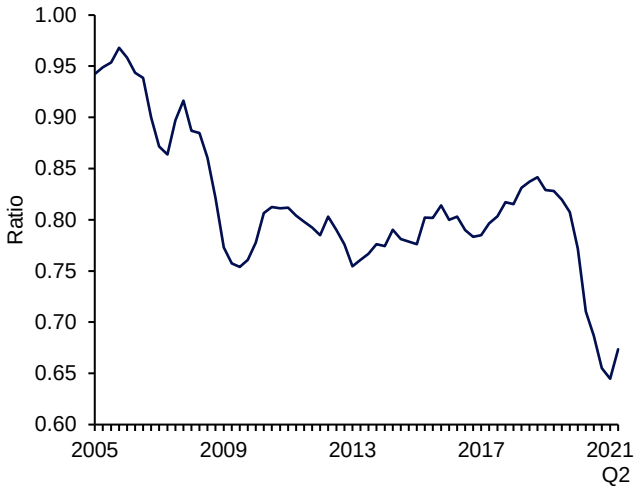
Source: MAS

Note: Data till June 2021 due to changes to the statistics reported in MAS' Monthly Statistical Bulletin.

The velocity of money (M2), computed on a rolling four quarters of nominal GDP and end-of-period basis, picked up in Q2 2021, reflecting the relative improvement in demand and consumption opportunities since the end of the circuit breaker measures that prevailed in Q2 2020 **(Chart 4.11)**. The velocity of money will likely further normalise in the months ahead as confidence improves and support nominal GDP expansion.

Chart 4.11 The velocity of money (M2) picked up in Q2 2021

Velocity of money (M2)



Source: EPG, MAS estimates

4.2 Fiscal Policy

Budget 2021 refined the government's pandemic relief measures and renewed efforts to secure inclusive and sustainable long-term growth

The government delivered Budget 2021 in February, with a focus on providing support to the segments of the economy that remained severely affected by the pandemic, as well as securing Singapore's longer-term growth prospects. As the economy has started to recover, the government's near-term relief measures shifted away from providing broad-based support towards targeted assistance directed at segments that continue to be adversely affected by the crisis. The fiscal package also included longer-term measures to facilitate Singapore's transition to a more inclusive, resilient, digital and green economy. At the same time, the government reiterated its commitment to fiscal sustainability amid the record budget deficit incurred in 2020 and the unprecedented size of the drawdown of Past Reserves. The Budget recognised the need for a fair distribution of fiscal burdens across generations. Accordingly, the government announced its intention to borrow to finance major, long-term infrastructure development through the Significant Infrastructure Government Loan Act (SINGA).

Budget 2021 forecasted an overall budget deficit of $11 billion, down from $65 billion in FY2020. The fiscal policy stance remained expansionary, as indicated by the deficit in the cyclically-adjusted budget balance. However, the estimated fiscal impulse turned negative, reflecting the large injection last year and the appropriate tapering of support to the Singapore economy as it had clearly emerged from the trough of the recession in Q2 2020.

Fiscal policy continued to respond in a decisive and targeted way as the pandemic situation and its impact evolved

Since May, Singapore has experienced renewed waves of COVID-19 infections, which led to the imposition of stricter safe management measures to curb local transmission of the virus. However, unlike the economy-wide Circuit Breaker that was imposed last April, which saw the shutdown of large swathes of the economy, the government employed more targeted measures instead.

Broadly, Singapore saw three new waves of infections over the last six months: in May–Jun, Jul–Aug, and from September. The first two waves, which occurred when vaccination rates were still relatively low, prompted the nation's shift to Phase 2 (Heightened Alert) (P2HA). Safe management measures were tightened in May–Jun as well as Jul–Aug to reduce transmission risks in indoor settings whilst still allowing most parts of the economy to continue operating. Limits on social interactions were tightened, dining-in was prohibited, sports, recreation and outdoor facilities were mostly closed, and employees returned to working-from-home as a default. Two groups of firms were particularly impacted. The first included firms that were required to suspend most, if not all of their operations. These were largely firms providing in-person services that had become clusters of transmission, or which were unable to pivot fully to fulfilling demand online. The second group included firms whose operations, while not suspended by the government, were affected by individuals voluntarily curtailing their movements.

The government introduced two packages of support measures amounting to more than $2 billion from May to July. These measures aimed at providing timely but temporary support to help tide affected businesses and individuals over disruptions to their incomes and

cashflows. The calibration of support offered was based on the impact of the tightened safe management measures, with the bulk of the assistance going towards the worst-hit sectors.

First, the Jobs Support Scheme (JSS) was enhanced to provide further support to affected firms and help them retain workers during P2HA. Firms which had to suspend most, if not all, of their operations[5] received 50% of JSS support from 16 May to 11 July, while those whose operations were significantly impacted[6] received 30% of JSS support for the same period. This was tapered down to 10% from 12 to 21 July. Second, the government also provided rental support for eligible SMEs and non-profit organisations (NPOs) who were tenants and owner-occupiers of qualifying commercial properties. Cleaning fees were also subsidised for cooked food stallholders in government-owned hawker centres. Third, the measures provided cashflow relief for affected individuals. The government introduced the COVID-19 Recovery Grant (Temporary) to provide up to $700 per payout for eligible employees and self-employed persons. The suspension on repayment and interest charges for Ministry of Education loans was extended. At the same time, financial assistance to taxi and private hire car (PHC) drivers through the COVID-19 Driver Relief Fund (CDRF) was temporarily enhanced and extended in both Heightened Alert periods as ridership was expected to fall.

The fiscal policy response to the recent waves of infections was nimble and timely, and the scope of the fiscal support measures was refined depending on the impact of pandemic developments on affected sectors. The July package took into account the continued strain and disruptions on the affected businesses, and therefore provided a greater degree of support compared to May. For instance, the JSS support for firms that had to close or suspend most of their activities was raised to 60% from 22 July to 18 August, while that for sectors that were significantly affected was lifted to 40% for the same period. The tourism sector also became eligible for 40% wage support under JSS in the July package. This was tapered down to 10% from 19 to 31 August. Recognising that hawkers and market stallholders were disproportionately affected by the reimposition of P2HA in mid-Jul–Aug, the government stepped up support measures for this particular group. For example, the Market and Hawker Centre Relief Fund provided a one-off cash assistance of $500 per stallholder operating in government-run hawker centres and markets.

With more than three-quarters of the population fully vaccinated by late August, the government proceeded to gradually reopen the economy, as part of its plan to manage COVID-19 as an endemic disease. However, community safe management measures were slightly tightened again towards the end of September to stabilise the COVID-19 situation and protect Singapore's overall healthcare capacity. Consequently, the government renewed its assistance for affected firms and individuals through a $1.3 billion Stabilisation Phase support package. As the safe management measures imposed from September were less stringent than in the previous two rounds, and economic agents had become better adapted to operating amidst the pandemic, the extent of support provided was more modest compared to the May and July packages combined. For instance, only 25% of JSS support was provided for affected sectors[7] from 27 September to 21 November.

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5 These include F&B, performing arts & arts education, as well as gyms & fitness studios.

6 These include retail, museums, art galleries & historical sites, cinemas and family entertainment.

7 Affected sectors refer to F&B, retail, cinemas, museums, art galleries & historical sites, family entertainment, tourism, gyms & fitness studios, and performing arts & arts education.

Table 4.2 at the end of this chapter summarises the key measures across Heightened Alert and Stabilisation Phases.

There was no further drawdown on Past Reserves as the government reallocated its budget to fund the additional support measures

Through two Ministerial Statements in July, the government stated that the Heightened Alert support measures introduced in May and July were expected to cost more than $2 billion in total. These packages would not add to the budget deficit, as they would be funded through budget reallocations. As Parliament had passed the SINGA following Budget 2021, the government could free up $0.6 billion, from capitalisation of development expenditure for nationally-significant infrastructure, to finance the support packages. At the same time, an additional $1.4 billion of funds would be reallocated from underused operating and development expenditure due to delays in projects arising from COVID-19.[8] Likewise, the $1.3 billion Stabilisation Phase fiscal support package would have no impact on the underlying deficit, as it would be funded by higher-than-expected revenues collected to date. There was therefore no need to draw further on Past Reserves.

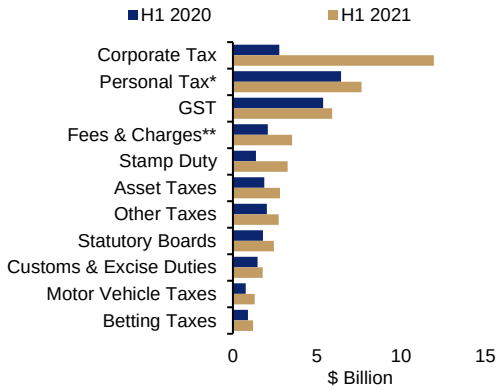
There was a broad-based increase in government operating revenue in H1 2021

In H1 2021, total operating revenues increased to $44.8 billion (17.7% of GDP) from $26.4 billion (11.5% of GDP) over the same period a year ago. The increase was broad-based across all receipt sources, reflecting the Singapore economy's recovery from the worst of the pandemic-induced recession in 2020 and the tapering of fiscal support measures. Notably, corporate income tax (CIT) more than quadrupled to $11.9 billion from $2.8 billion in the same period a year ago **(Chart 4.12)**. This was due to a much lower base of CIT collections in H1 2020 as a result of the CIT rebates granted under Budget 2020, as well as CIT deferments which led to rescheduling of FY2020 CIT collections. Meanwhile, stamp duty collections increased by $1.9 billion to $3.3 billion compared to a year ago, when property transactions were muted during the Circuit Breaker period. Similarly, Vehicle Quota Premiums collected increased by $0.9 billion compared to H1 2020 due to base effects, as COE bidding exercises were suspended in Q2 2020.

[8] These projects have merely been postponed, not cancelled. Expenditure on them will still be incurred in future financial years.

Chart 4.12 As tax deferments expired and the Singapore economy recovered, all components of government operating revenues improved

Operating revenue by source



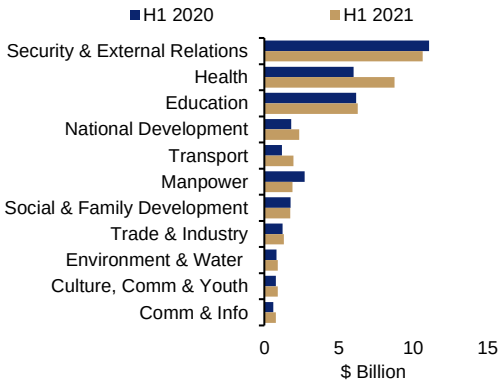
Source: MOF

* Includes withholding tax

** Includes Vehicle Quota Premiums

Chart 4.13 Operating expenditure rose in H1 2021, driven mainly by increased pandemic-related spending

Operating expenditure by sector



Source: MOF

Operating expenditure continued to increase while development expenditure fell

Total government expenditure increased by $2.8 billion in H1 2021 from a year ago to $48 billion (19.0% of GDP) on the back of a step-up in operating expenditure, which more than offset the small decline in development expenditure.

Operating expenditure, which includes expenses on manpower, operating grants and subventions to statutory boards and other organisations, rose to $38.7 billion in H1 2021, from $35.3 billion a year ago. Operational outlays by the Ministry of Health (MOH) increased by $2.7 billion, mainly due to continued funding for public health management to tackle COVID-19 as well as for the increased consumption of health and aged care services. In addition, patient subsidies increased with the opening of the Woodlands Health Campus **(Chart 4.13)**. Meanwhile, the Ministry of National Development spent $0.5 billion more in H1 2021 than a year ago due to increased spending on COVID-19-related facilities, while the Ministry of Transport's operating expenditures increased by $0.8 billion owing to higher spending on COVID-19 relief measures, especially for the aviation sector.

In contrast, development expenditure, which comprises longer-term investment in capitalisable assets such as buildings and roads, fell by $0.7 billion to $9.3 billion (3.7% of GDP) in H1 2021. The Ministry of Trade and Industry (MTI) recorded a $0.4 billion decrease in developmental expenses due to a tapering of expenditure to strengthen Singapore's supply resilience in response to COVID-19. MOH recorded lower development outlays as tightened safe management measures led to delays in construction projects **(Chart 4.14)**.

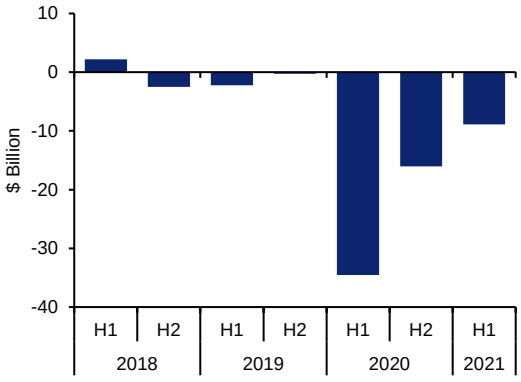
Chart 4.14 Development expenditures were lower due to decreased outlay from MTI and MOH

Development expenditures by sector

Source: MOF

Chart 4.15 The basic deficit in H1 2021 contracted steeply from the same period last year

Government basic balance



Source: MOF

The government's basic deficit contracted sharply

The government registered a primary deficit of $3.2 billion (1.3% of GDP) in H1 2021, a steep reduction from $18.8 billion in H1 2020, as the increase in operating revenue more than offset the rise in expenditure.

Special transfers, excluding top-ups to endowment and trust funds, declined to $5.7 billion, from $15.8 billion a year ago. The decline in transfers reflected the tapering of COVID-19 government assistance schemes, such as the JSS wage subsidies for firms.

The government's basic balance, which takes into account the primary balance and special transfers to households and firms (excluding top-ups to endowment and trust funds), recorded a smaller deficit of $8.9 billion (3.5% of GDP) in H1 2021 compared to $34.6 billion a year ago **(Chart 4.15)**.

The government revised its budget estimates for FY2021 to account for the economic recovery and updates to its fiscal support measures

The government's primary deficit for FY2021 has been revised down to $24.7 billion, from $25.7 billion estimated during Budget 2021 in February **(Table 4.1)**. The decrease was largely due to the expected fall in expenditures outweighing the expected slight decline in revenues. Special transfers, however, are projected to increase to $6.5 billion, from the $4.9 billion estimated in February, owing to the additional COVID-19 support measures introduced since May. As such, the basic deficit is expected to increase by $0.6 billion despite the smaller revised primary deficit. The overall fiscal deficit for FY2021 is projected to remain unchanged at $11.0 billion after taking into account the capitalisation of $0.6 billion of development expenditure under SINGA to reallocate the budget and fund additional COVID-19 relief measures.

Table 4.1 Budget summary

	FY2021 Budgeted		Revised FY2021 (as at Ministerial Statement on 26 Jul 2021)	
	$ Billion	% of GDP	$ Billion	% of GDP
Operating Revenue	76.6	15.2	76.4	15.0
Total Expenditure	102.3	20.2	101.1	19.8
Primary Surplus (+) / Deficit (−)	−25.7	−5.1	−24.7	−4.8
Less: Special Transfers (excluding top-ups to endowment/trust funds)	4.9	1.0	6.5	1.3
Basic Surplus (+) / Deficit (−)	−30.6	−6.0	−31.2	−6.1
Less: Special Transfers (top-ups to endowment/trust funds)	-	-	-	-
Add: Net Investment Returns Contribution	19.6	3.9	19.6	3.8
Less: Debt Servicing Costs*	-	-	0.0	0.0
Budget Surplus (+) / Deficit (−)	−11.0	−2.2	−11.7	−2.3
Add: Capitalisation of National Significant Infrastructure	-	-	0.6	0.1
Less: Depreciation	-	-	-	-
Overall Fiscal Position	−11.0	−2.2	−11.0	−2.2

Source: MOF

* Debt servicing costs for Revised FY2021 are estimated at $1 million

Table 4.2 Summary of key measures across Heightened Alert and Stabilisation Phases

KEY BUDGET INITIATIVES
A. FOR BUSINESSES

Easing Temporary Cashflow Constraints on Hard-hit Businesses

A1. Jobs Support Scheme

- Enhanced through the two Heightened Alert and Stabilisation Phases between May to November.
- Firms in sectors which had to suspend all or most of their operations to receive 50% wage support from 16 May to 11 July and 60% support from 22 July to 18 August.
- Firms in sectors which were not required to suspend operations but were significantly affected by the tightened safe management measuress to receive 30% wage support from 16 May to 11 July and 40% from 22 July to 18 August.
- 10% tapered wage support as business reopen after Heightened Alert from 12 to 21 July and from 19 to 31 August.
- Firms in sectors significantly affected by the tightened measures during Stabilisation Phase to receive 25% wage support from 27 September to 21 November.

A2. Rental Relief for Affected Businesses

- Between May and November, eligible stallholders in Government-owned hawker centres and tenants of Government-owned commercial properties will receive a total of 4 and 3 months of rental waiver respectively.
- During the same period, eligible SMEs and NPOs who are tenants or owner-occupiers in qualifying privately-owned commercial properties are also eligible for 2 months of rental cash payout through four tranches of the Rental Support Scheme.

A3. Temporary Bridging Loan Programme

- Extension for an additional six months from 1 October 2021 to 31 March 2022.

A4. Enhanced Enterprise Financing Scheme - Trade Loan

- Extension for an additional six months from 1 October 2021 to 31 March 2022.

A5. Food Delivery Booster Package

- Re-introduced from 22 July to 18 August 2021 to help F&B businesses reduce the costs of selling on delivery platforms.
- The package funded 20% of the delivery cost per trip for food delivery services via third party logistics players (e.g., Lalamove, Pickupp and GrabExpress).
- F&B businesses who were existing operators on or new entrants to the four online food delivery platforms will receive a reduction of five percentage points of the commission cost charged, with no cap on the qualifying food delivery transaction value.

A6. E-Commerce Booster Package

- Re-introduced from 16 May to 16 November 2021 to support retailers in diversifying operations and defraying the business costs of going online.
- Retailers can engage one of the appointed e-commerce platforms (e.g., Lazada, Qoo10, Shopee) to sell products online and expand their reach in the Singapore market. Eligible retailers will receive a one-time support to defray 80% of qualifying costs (capped at $8,000).

A7. Jobs Growth Incentive

- Extension of qualifying window by six months from September 2021 to March 2022.
- For each new local hire, eligible employers will receive wage support of 15% of the first $5,000 for up to six months, up to $4,500 per hire aged below 40.
- Higher wage support for mature hires aged 40 and above, people with disabilities and former offenders, of up to 50% of the first $6,000 for up to 12 months, up to $36,000 per hire.

B. FOR INDIVIDUALS

Targeted Help for Affected Individuals

B1. COVID-19 Driver Relief Fund

- The government set aside $27 million for a one-time top-up of an additional $10 per vehicle per day for all eligible taxi and PHC drivers from 16 May to end-June 2021 under the CDRF top-up on top of the existing CDRF.
- Extension of CDRF for 3 months from July 2021, with $40 million set aside to support taxi and PHC drivers. Under the extended CDRF (CDRF2), drivers received $10 a day for 60 days and $5 a day for the next 30 days.
- Enhancement of CDRF2 by $30 million following the re-entering of P2HA from 22 July to 18 August 2021. Eligible drivers received an additional $10 per vehicle per day from 22 July to 18 August 2021 and an additional $5 per vehicle per day in September 2021.
- Another $39 million set aside to further extend the CDRF by three months to cover the Stabilisation Phase, providing eligible drivers $10 per vehicle per day in October and November and $5 in December.

B2. COVID-19 Recovery Grant (Temporary)

- Provided temporary financial support to employees and self-employed persons who suffered from sudden and significant income loss during the Heightened Alert period, where applications were extended to end-August 2021.
- Workers who continue to be impacted and met the eligibility criteria could re-apply to receive a second payout.
- Employees who were placed on involuntary no-pay leave for at least one month received up to $700 per payout.
- Employees who experienced salary loss of at least 50% for at least one month, or self-employed persons who experienced a Net Trade Income (NTI) loss of at least 50% for at least one month compared to their average monthly NTI in 2019 or 2020, received up to $500 per payout.

B3. Assistance for Hawkers

- Subsidies for table-cleaning and centralised dishwashing services.
- Eligible hawkers who operate in government hawker centres and markets received a one-time cash assistance of $500 per stallholder under the newly introduced Market and Hawker Centre Relief Fund.

Source: MOF

Box B: Review of MAS Money Market Operations in FY2020/21[1]

Money market operations in Singapore are undertaken to manage liquidity within the banking system and are distinct from the implementation of exchange rate policy. This Box reviews MAS' money market operations in FY2020/21.

The conduct of money market operations is briefly explained in the context of Singapore's exchange rate policy framework. This is followed by a review of banks' demand for cash balances, the behaviour of autonomous money market factors, and the composition of money market operations during this period.

Money market operations in Singapore

The open-economy trilemma posits that a country that maintains an open capital account cannot simultaneously manage its exchange rate and domestic interest rates. Given Singapore's open capital account and exchange rate-centred monetary policy, domestic interest rates are necessarily endogenous. They are determined not just by MAS' exchange rate policy but also by global factors, including international interest rates. MAS' money market operations are thus not targeted at any level of interest rate. Instead, they are aimed at ensuring that there is sufficient liquidity in the banking system to meet banks' demand for reserve and settlement balances, and to reduce the risk of sharp interest rate volatility.

Money market operations are conducted daily by the Monetary & Domestic Markets Management Department (MDD) at MAS. The extent and size of daily money market operations depend on market conditions, particularly the banking sector's demand for funds, as well as the net liquidity impact of autonomous money market factors, as outlined in the sections below.

Banks' demand for cash balances

Banks in Singapore are required by regulation[2] to maintain with MAS a Minimum Cash Balance (MCB) equivalent to a specified proportion of their qualifying liabilities. On a daily basis, banks have to maintain an effective end-of-day cash balance of between 2% and 4%[3] of their liabilities base, while on average in each two-week maintenance period, cash balances should not fall below 3% of their liabilities base. This demand from banks for meeting of MCB requirements forms the base demand for cash balances. In FY2020/21, this demand for cash balances to meet reserve requirements increased by approximately S$1 billion **(Chart B1)**.

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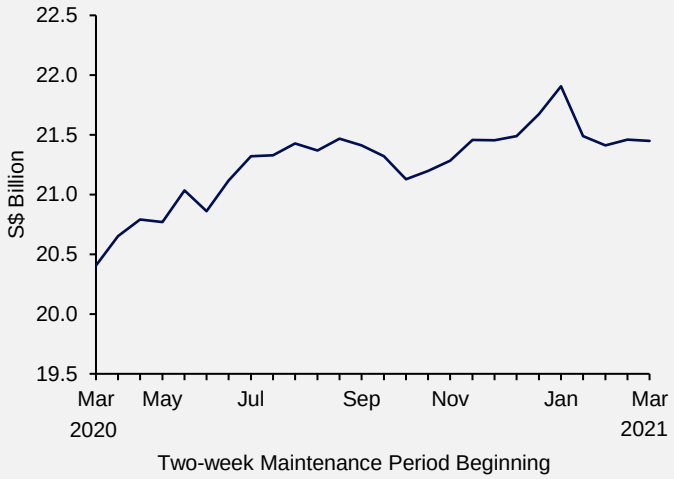
1 This Box was contributed by the Monetary & Domestic Markets Management Department of MAS. More information on MAS' money market operations is available in the monograph "Monetary Policy Operations in Singapore" published on the MAS website in March 2013.

2 As set out in MAS Notice 758, which applies to all banks in Singapore.

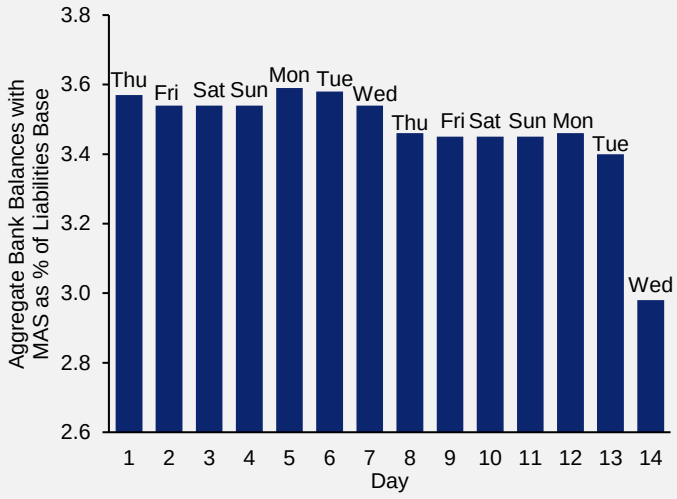
3 Cash balances in excess of 4% of liabilities do not count towards meeting the MCB requirement.

Chart B1 Average required cash balances over two-week maintenance periods



Overlaid on the longer-term trend, banks' demand for cash balances to meet reserve requirements also displays a fortnightly pattern. Empirically, banks tend to maintain higher cash balances during the start of a maintenance period to avoid being short of cash towards the end of the period. Upon meeting the average MCB requirement of 3%, banks will deposit their excess cash with the MAS Standing Facility towards the end of the maintenance period to earn interest as MAS does not pay any interest on the cash balances.[4] Hence, the daily cash balances required by the banking system during the last few days of a maintenance period are usually lower. This fortnightly pattern was evident also in the daily cash balances of banks in FY2020/21 **(Chart B2)**.

Chart B2 Daily effective cash balances as percentage of banks' liabilities base over a typical two-week maintenance period in FY2020/21



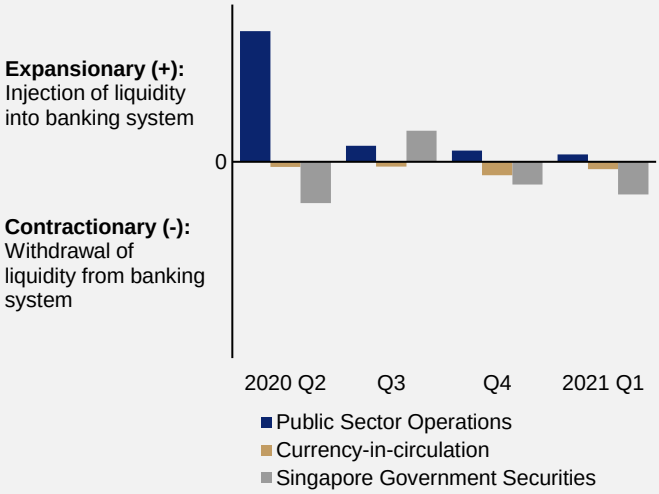
[4] From a regulatory perspective, such deposits will also help to reduce the liabilities base, and in turn the amount of reserve balances banks are required to hold.

Finally, in addition to cash balances for meeting of MCB requirements, banks may hold additional amounts of cash balances to make large payments (for settlement purposes) or for precautionary motives amid heightened market volatility. This was observed as well at the onset of the COVID-19 pandemic in Q2 2020. To meet the increased demand from banks for precautionary balances, MAS maintained a higher-than-usual level of liquidity in the banking system during this period, equivalent to about 1% of the banking system liabilities base. The excess liquidity was withdrawn from the banking system in the subsequent months.

Autonomous money market factors

Chart B3 shows the liquidity impact of autonomous money market factors, which include: (i) public sector operations; (ii) currency in circulation; and (iii) Singapore Government Securities (SGS) and Treasury Bills (T-bills) issuance, redemption and coupon payments, over FY2020/21. Public sector operations include the government's and CPF Board's net transfers of funds between their accounts with MAS and their deposits with banks. In FY2020/21, the liquidity impact of the autonomous money market factors was expansionary on a net basis, as the government's fiscal response to COVID-19 led to an overall injection of funds through public sector operations.

Chart B3 Liquidity impact of autonomous money market factors

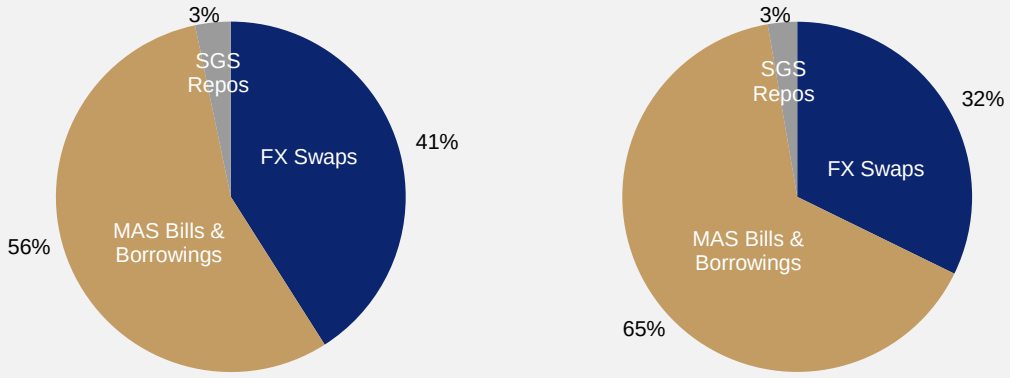


Composition of money market operations

MAS relies on four money market instruments to manage liquidity in the banking system, namely: (i) FX swaps; (ii) SGS repos; (iii) clean borrowings; and (iv) MAS Bills.[5] The share of FX swaps decreased from FY2019/20 to FY2020/21, while the share of MAS Bills and clean borrowings increased in the same period and continued to comprise the largest share of the total in both periods **(Chart B4)**.

[5] FX swaps are contracts in which MAS borrows Singapore dollars from, and simultaneously lends another currency to, the second party. SGS repos refer to collateralised borrowing or lending of Singapore dollars against SGS. Clean borrowings are MAS' borrowings of Singapore dollars on an uncollateralised basis.

Chart B4 Composition of money market operations by instrument



FY 2019/20 FY 2020/21

Special Feature A

50 Years of Inflation Experience in Singapore

1 Introduction

This Special Feature provides a review of Singapore's inflation experience since the establishment of MAS in 1971.[1] It identifies the historical drivers of inflation outcomes and monetary policy responses over the course of the past five decades. Several econometric approaches are taken to assess how the exchange rate-centred monetary policy has been formulated to address inflation during the economy's major cyclical phases. The Feature concludes with some observations on the medium-term outlook for inflation in Singapore in light of ongoing structural changes in the global economy.

2 Six Main Phases of Singapore's Historical Inflation Experience

The history of Singapore's headline inflation over the past 50 years can be broadly divided into six time periods, with breakpoints between the phases marked by shifts in the dynamics of inflation. Using a rolling autoregressive model for headline inflation, Singapore's CPI-All Items inflation from Q1 1971 to Q4 2020 can be analysed in terms of its long-term expectation and idiosyncratic components.[2] The long-term expectation is estimated as the model-implied unconditional mean for inflation, which in turn is a function of structural and persistence parameters derived from the time series characteristics of headline inflation. The idiosyncratic component is the deviation of inflation outturns from the expected value, capturing the effects of shocks from events such as global oil price movements or recessions. Long-term expected inflation volatility can also be derived as the unconditional variance of inflation in the model. The estimates of the long-term expected levels and volatility of headline inflation, so derived, are used as the basis to categorise Singapore's inflation experience into the six distinct periods **(Chart 1)**.

The tumultuous seventies (1971 to 1980) saw Singapore facing high long-term expected inflation levels and volatility, with the former averaging 5.8% and the latter, 8.6% points.[3] The subsequent period from 1981 to 1987 saw significant declines in both measures. Long-term expectations for headline inflation were relatively low and stable from 1988 to 1996, then fell

1 This Special Feature has benefitted from useful discussions and comments from Professor Ramkishen S. Rajan of the Lee Kuan Yew School of Public Policy.

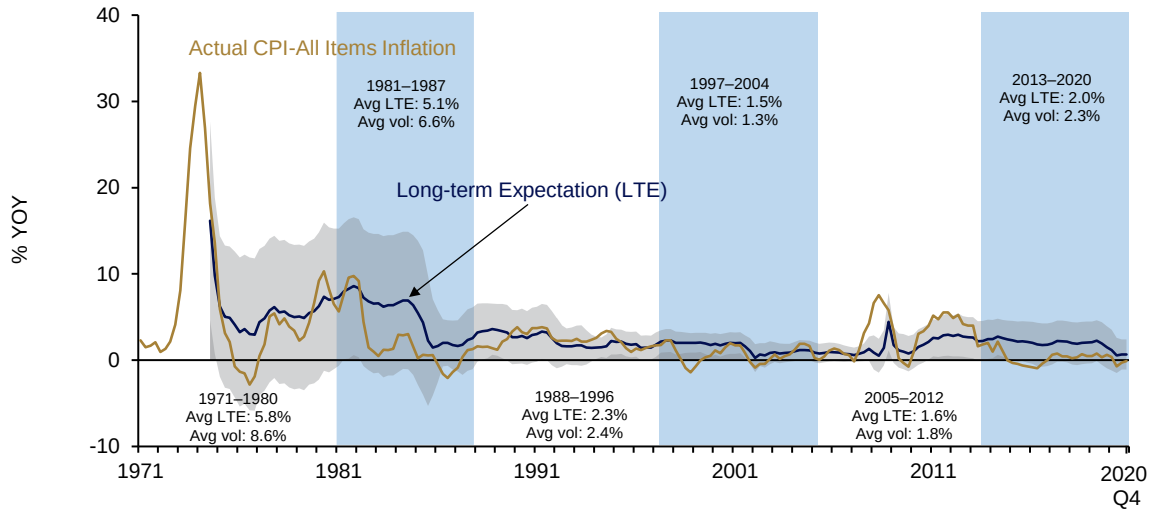
2 The inflation dynamics are parsed into structural (α), persistence (β) and shock components (ε) using a first order autoregression model as in Aziz (2021), with a 12-year rolling window, given by the following equation: $\pi_t = \alpha + \beta\pi_{t-1} + \varepsilon_t$, where π_t represents headline inflation at time t and ε_t is an idiosyncratic error term. Under this framework, the unconditional mean of CPI-All Items inflation is given by $\frac{\alpha}{1-\beta}$. Meanwhile, the unconditional standard error or volatility of CPI-All Items inflation is given by $\frac{\sigma}{\sqrt{(1-\beta^2)}}$,where σ is the standard error of the idiosyncratic component, ε_t, as estimated by the standard error of regression.

3 The headline inflation series is only available from Q1 1962. With a 12-year rolling regression window, the first estimate starts from 1974.

further during the period 1997 to 2004 and reached a low of 0.2% in Q1 2002 after successive economic shocks. Both the expected level and volatility of inflation subsequently rose from 2005 to 2012, peaking at 4.5% and 3.3% points respectively in Q4 2008, during the GFC. Since 2013, long-term expectations for headline inflation have declined gradually, although volatility has remained somewhat elevated. During the recent COVID-19 pandemic, the long-term expected level of inflation dipped further to around 0.6% in Q2–Q4 2020.

From a long-term perspective, the expected levels and volatility of headline inflation in Singapore have been trending down since the mid-1970s, reflecting structural factors such as the secular decline in external inflation due to the effects of globalisation, the impact of liberalisation of some domestic industries on consumer prices, lower currency volatility, and more diversified import sources. The following section takes a closer look at Singapore's inflation experience in each of the six periods identified in **Chart 1** in the context of shifting global macroeconomic currents, and of changes in MAS' monetary policy framework. The **Box** within this Special Feature further examines trends in Singapore's real effective exchange rate (S$REER) against the backdrop of relative inflation and nominal effective exchange rate (S$NEER) movements.

Chart 1 CPI-All Items inflation and long-term expectation (LTE) of headline inflation for Singapore by the six main phases from Q1 1971 to Q4 2020



Source: DOS and EPG, MAS estimates

Note: The headline inflation series is only available from Q1 1962. With a 12-year rolling regression window, the first estimate is for Q1 1974. However, the LTE series only starts from Q3 1974 as headline inflation was non-stationary for the 12-year rolling windows ending in Q1 and Q2 1974. The persistence measure for Q1 to Q3 2008 was interpolated for these quarters as headline inflation was non-stationary. The long-term volatility of headline inflation (vol) is marked out by the grey bands.

3 Review of Inflation and Singapore's Monetary Policy Regime

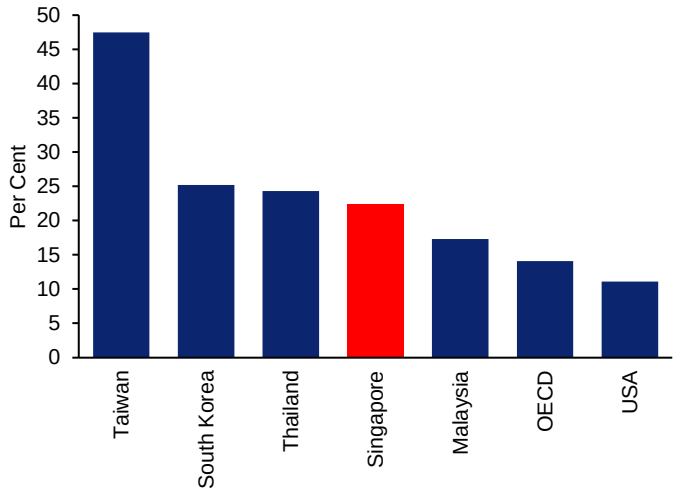
1971–1980: The swinging seventies

The seventies proved to be a tumultuous decade that saw high and volatile inflation in Singapore. Barely one year after MAS was established in January 1971, strains on the Bretton Woods system of fixed exchange rates emerged. Amid the turmoil in foreign exchange

markets over the next two years, the OPEC cartel of oil-producing countries engineered an embargo in October 1973 that led to a quadrupling in oil prices.

Higher oil prices led to cost-push inflation and drove Singapore's headline inflation to 20% in 1973 and around 30% y-o-y in the first half of 1974. These inflation outcomes were much higher than those in the advanced economies but were similar to some of the Asian economies **(Chart 2)**. In response to high imported inflation and surging domestic liquidity, MAS implemented an eclectic mix of monetary tightening measures, including raising banks' statutory reserve requirement from 5% to 9%, imposing credit ceilings and guidelines, and hiking interest rates by 2% points in October 1974 (see MAS, 2011a).

Chart 2 Peak annual average headline inflation in Singapore and comparators during the oil shock of 1973 to 1975



Source: DOS, Haver Analytics, OECD, World Bank and EPG, MAS estimates

Note: Inflation peaked in 1974 for all regions, except South Korea (peaked in 1975).

Domestic inflation quickly dropped to −1.9% in 1976. The monetary framework continued to evolve during this period. By 1975, while still utilising an eclectic monetary policy toolkit including influencing bank interest rates and adjusting reserve requirements, MAS had also begun to monitor the level of the S$NEER within an exchange rate policy band. The second oil price shock in the late 1970s caused Singapore's headline inflation to surge again, although this time to a lower peak of close to 10% in Q4 1980. The step-up in Singapore's inflation was again much larger than that in the advanced economies, but more modest than in many of the Asian economies.

1981–1987: A new exchange rate-centred policy framework

In the 1980s, headline inflation was significantly less volatile and long-term expected inflation declined **(Chart 1)**. Headline inflation in Singapore moderated to an average of around 2% p.a. between 1981 and 1987, from close to 7% in the 1970s **(Table 1)**. As oil prices fell sharply in the middle of the decade, inflation in Singapore declined in tandem with the global trend. Indeed, average inflation in Singapore was lower than that of most advanced and regional economies during this period.

Lower inflation in this period followed MAS' move towards formalising an exchange rate-centred regime as the country's monetary policy framework in 1981. From 1981 to 1985, the S$NEER appreciated by 22%, helping to filter out still-strong inflationary pressures in many of Singapore's major trading partners. Another factor driving inflation lower in this period was the country's first post-independence economic recession in 1985, which led to headline inflation briefly dipping into the negative domain in the following year. The decline in consumer prices was exacerbated by a slump in the global oil market, which generated sharp falls in the prices of oil-related items in the CPI basket (see MAS, 2003). In the face of the severe drop in aggregate demand and rising unemployment, MAS guided the S$NEER to a lower path. In addition, the government introduced several labour cost reduction measures in 1986, including lowering the employers' Central Provident Fund (CPF) contribution rate by 15% points, and imposing a two-year wage-restraint policy in the public sector. After a period of relatively strong unit labour cost (ULC) growth in the early 1980s[4], ULC contracted by 9% in 1986, further dampening inflationary pressures **(Chart 3)**.

Table 1 Headline inflation in Singapore and comparators by phases (mean and standard deviation)

Economies	1971 to 1980	1981 to 1987	1988 to 1996	1997 to 2004	2005 to 2012	2013 to 2020
Singapore	6.6	2.2	2.4	0.7	2.9	0.5
	(8.0)	(3.1)	(0.8)	(0.9)	(2.3)	(0.9)
Advanced Economies						
OECD	10.0	9.4	6.3	3.5	2.4	1.7
	(3.2)	(1.8)	(1.6)	(0.9)	(0.9)	(0.6)
USA	7.9	4.7	3.7	2.4	2.5	1.5
	(3.3)	(2.8)	(1.0)	(0.6)	(1.3)	(0.7)
Asian Economies						
South Korea	16.5	6.1	6.4	3.6	3.0	1.1
	(7.8)	(6.9)	(1.7)	(1.9)	(0.9)	(0.5)
Malaysia	6.0	3.5	3.5	2.2	2.6	1.7
	(4.7)	(3.5)	(0.8)	(1.4)	(1.5)	(1.6)
Taiwan	11.1	3.1	3.5	0.6	1.5	0.7
	(13.7)	(5.9)	(1.0)	(0.8)	(1.3)	(0.7)
Thailand	10.0	4.2	5.0	2.8	3.3	0.6
	(7.5)	(4.0)	(1.0)	(2.7)	(2.0)	(1.1)

Source: DOS, Haver Analytics, OECD, World Bank and EPG, MAS estimates

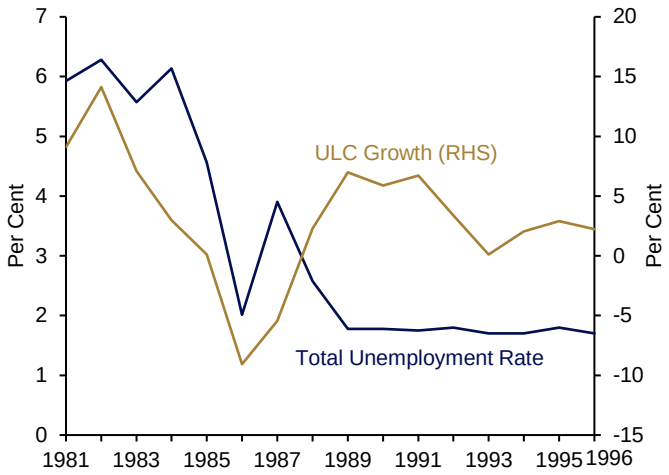
Note: These are period averages of headline inflation in %, with standard deviations in % point, in parentheses.

1988–1996: The boom years

A period of strong and sustained economic growth after the 1985 recession drove an acceleration in domestic headline inflation over 1988–1996. Average real GDP growth in Singapore stepped up to 9.1% during these boom years, from 6.7% in the previous period. At the same time, the total unemployment rate in the country fell to an average of 1.8%, significantly lower than in the early 1980s. Reflecting the strong growth and tighter labour market conditions, Singapore's headline inflation averaged 2.4% over this period, slightly higher than 2.2% in the previous period, but remained significantly lower than in comparator economies **(Table 1)**. In response, MAS allowed the currency to appreciate steadily during this phase, which helped to contain overall domestic inflationary pressures.

[4] High ULC growth in the early eighties partially reflected the government's high-wage policy during that period and was also driven by a steady increase in the employers' contribution rate to the CPF to 25% in July 1984.

Chart 3 Singapore's total unemployment rate and ULC growth, 1981 to 1996



Source: DOS, Haver Analytics, IMF and EPG, MAS estimates

Note: Total unemployment rate data prior to 1986 excludes non-residents.

1997–2004: The crisis years

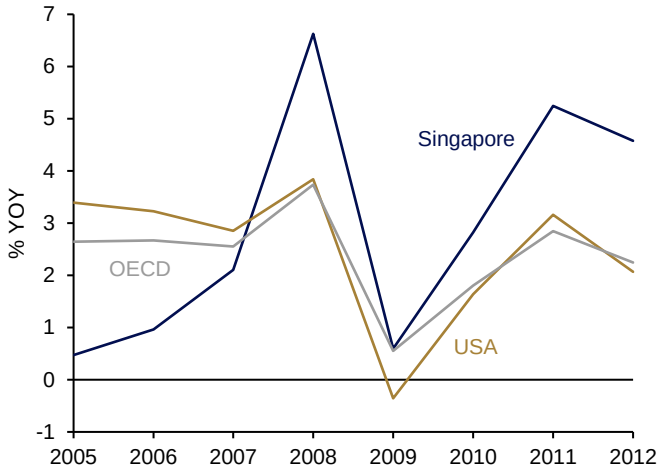
From 1997 to 2004, Singapore experienced successive negative shocks—the AFC in 1997, the 2001 IT Downturn, and the Severe Acute Respiratory Syndrome (SARS) epidemic in 2003—that caused headline inflation to turn briefly negative. Weakness in domestic economic activity and elevated resident unemployment weighed on consumer prices (see MAS, 2003). In addition, this period coincided with the government's moves to liberalise various industries (such as the telecommunications sector), leading to additional downward pressure on prices. Headline inflation for Singapore averaged 0.7% during these years—significantly lower than the previous period and weaker than most comparators—although long-term expected inflation declined by less **(Table 1 and Chart 1)**. The volatility of inflation fell to its lowest level among the phases. Accordingly, the S$NEER was guided to a lower path to mitigate the effects of these sizeable macroeconomic shocks.

2005–2012: Domestic constraints and the GFC

In the latter half of the 2000s, exchange rate policy was generally tightened as Singapore's headline inflation rose rapidly, from 0.5% in 2005 to a peak of 6.6% in 2008 **(Chart 4)**. This increase occurred against a backdrop of strong global commodity prices, driven in part by rapid economic growth in China and other emerging market economies. Besides external cost pressures, higher headline inflation in Singapore also reflected stronger domestic output growth as the economy recovered from the shocks of the previous period. At the same time, rising business costs (import, wage and rental costs) passed through to consumer prices (see MAS, 2007b) while the GST hike in mid-2007 further added to domestic price pressures.[5]

[5] GST was raised from 5% to 7% in July 2007. This was estimated to add around 0.4–0.6% point to headline inflation each year in 2007 and 2008 (see MAS, 2007a).

Chart 4 Singapore's headline inflation vis-à-vis advanced economies, 2005–2012



Source: OECD, Haver Analytics, DOS and EPG, MAS estimates

The uptrend in domestic inflation, however, ended in 2009 with the onset of the GFC. Singapore once again entered recession, which was followed by a decline in headline inflation. In the wake of the GFC, Singapore's headline inflation recovered and stayed relatively high at 4.2% p.a. on average during the early 2010s, reflecting both cost-push and demand-pull price pressures. Domestic cost pressures gradually rose alongside a tighter labour market as foreign worker policies became more binding[6] (see MAS, 2011c). Meanwhile, on the external front, commodity prices picked up sharply. The robust economic recovery from the GFC and resilient domestic demand gave firms more leeway to pass on cost increases to consumers. Concurrently, the low global interest rate environment post-GFC underpinned strong demand for private transport and accommodation. This fed through to headline inflation as COE premiums were driven up by the strength of car demand relative to quota supply, while tightness in the housing rental market lifted rental costs (see MAS, 2011b).

2013–2020: Slower growth and a pandemic

Between 2013 and the onset of the COVID-19 pandemic, persistent weakness in global and domestic inflation allowed for a more accommodative exchange rate policy. Global inflation fell to a low of 1.4% in 2015 alongside the decline in commodity prices.[7] Singapore's headline inflation was still lower than other comparators, reflecting the added effect of weak domestic accommodation inflation **(Table 1)**. The accommodation component exerted an average drag of 0.6% point p.a. on headline inflation in 2015–19, as earlier domestic supply constraints in the housing rental market began to ease and reverse (see MAS, 2014a). In addition, car loan restrictions introduced in 2013, as part of a broader set of macroprudential measures, helped to moderate demand for cars and rein in excessive increases in COE premiums, thus suppressing private transport inflation (see MAS, 2014b). Reflecting a combination of muted global inflation as well as a weak domestic rental market, headline

6 Foreign worker measures were tightened successively in 2010–12, including the raising of qualifying salaries for Employment and S Pass holders as well as increases in foreign worker levies for S Pass and Work Permit Holders.

7 Source: IMF International Financial Statistics. World CPI data is available from 1981 to 2020.

inflation stepped down from an average of 2.9% p.a. in the previous phase to 0.5% p.a. in this phase **(Table 1)**.

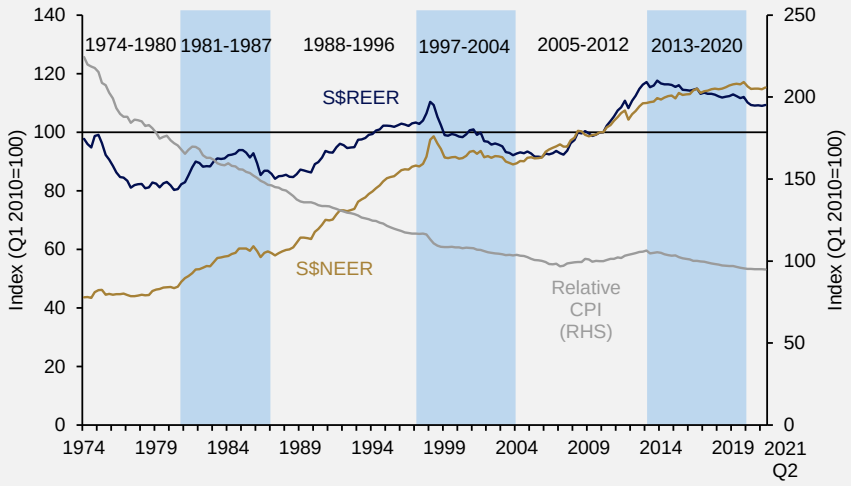
More recently, the outbreak of the COVID-19 pandemic led to a sharp drop in inflation, with headline inflation dipping into negative territory (averaging −0.2%) in 2020. However, this has been more than reversed as demand has recovered more rapidly than supply, amid severe pandemic-related disruptions to global supply chains. The pandemic will likely lead to structural changes in economic behaviour on many fronts, although it is too early to characterise the overall long-run effect on the inflation process, and to tell whether the trend of subdued global inflation during 2013–2020 will continue.

Box: Trends in Singapore's Real Effective Exchange Rate

This Box examines the trends in Singapore's S$REER over the past five decades and discusses the key factors underlying its broad movements. EPG adopts the neoclassical view that the long-run equilibrium path of the S$REER is determined by real supply-side factors, such as trends in productivity in Singapore relative to those abroad, and therefore cannot be influenced by the central bank. Prices and wages will adjust over time to remove any deviation of the S$REER from equilibrium. MAS' S$NEER policy settings can only affect the level of the S$REER temporarily due to the presence of short-term wage and price rigidities. Empirical analysis of MAS' policy actions suggests that the associated nominal exchange rate movements are consistent with the aim of stabilising output around potential over the business cycle and ensuring medium-term price stability.

The S$REER has trended up over the past 47 years, rising by about 12% over the period and driven fundamentally by the economy's rapid development and high productivity growth. The trend increase in the S$REER is the result of a steady rise in the S$NEER that was partly offset by falling relative prices, as the domestic price level was rising more slowly than prices in Singapore's key trading partners **(Chart 5)**. In the interim, however, there have been recurrent fluctuations around the long-term appreciation path, mainly reflecting the impact of economic shocks. For instance, the S$REER depreciated in the wake of the 1985 recession and the AFC.

Chart 5 S$REER, S$NEER and relative CPI, Q1 1974 – Q2 2021



Source: Haver Analytics and EPG, MAS estimates

Note: Relative CPI is computed as the ratio of consumer prices in Singapore vis-à-vis that in trading partners.

Following the six-phase classification described in the main text of this Special Feature, the S$REER depreciated in the first phase over 1974–1980[1], as the price level in Singapore

[1] Data on Singapore's S$REER and S$NEER are only available from 1974 onwards.

rose at a slower pace relative to those in its trading partners on average.[2] The S$NEER only appreciated modestly as MAS then had a mandate to keep the Singapore dollar stable, with the decision made in 1975 to keep the currency on a managed float as opposed to a free float. However, MAS had yet to shift formally to an exchange rate-centred policy framework, and Singapore had exchange controls in place until many of these were liberalised in 1978.

In the second phase from 1981 to 1987, the S$REER initially strengthened after the shift to an exchange rate-centred regime in 1981, as domestic cost pressures rose and MAS appreciated the S$NEER significantly to curb import price inflation originating from the second oil price shock. In 1985, Singapore faced its first recession post-independence, precipitated by both a fall-off in external demand and weaker construction activity as the infrastructure boom of the early 1980s faded. In response, the S$NEER was allowed to weaken, while policies to lower business costs (such as reductions in employers' CPF contribution rate) were implemented, resulting in a decline of the S$REER.

The recovery from recession was followed by the boom years of 1988–1996, when both the S$REER and the S$NEER strengthened steadily. As inflationary pressures built up alongside robust global growth, MAS allowed the S$NEER to appreciate. The strengthening in the S$NEER helped to contain inflationary pressures and prevented overheating of the domestic economy in the first half of the 1990s, when GDP growth averaged around 9% p.a. During the AFC of 1997–1998, MAS shifted to a looser policy stance, while adopting greater flexibility in the management of the S$NEER to accommodate the attendant financial market volatility. However, the S$NEER, and consequently the S$REER, rose in 1998 before falling, reflecting the widened policy band and the sharper depreciation of some regional currencies against the US dollar, notwithstanding some weakening of the S$/US$ bilateral exchange rate. As the Singapore economy began to rebound in 2000, MAS embarked on a gradual, modest appreciation path for the policy band. Faced soon after with recessionary shocks—the IT Downturn in 2001 and SARS in 2003—MAS again switched to a more accommodative policy, flattening the slope of the policy band in July 2001 and re-centring it downwards twice, in January 2002 and July 2003. The decline in the S$NEER, together with a continued fall in Singapore's prices relative to foreign prices, resulted in a broad depreciation in the S$REER over this period.

The S$REER experienced an appreciation phase in the period spanning the late 2000s to early 2010s, reflecting the combination of an uptrend in the S$NEER and rising relative prices. Apart from a brief period during the GFC, MAS set the S$NEER on an appreciation path over most of this period to contain domestic inflation. The relative strength of inflation can be attributed to robust aggregate demand and binding supply constraints, both before and after the GFC, with a hike in the GST rate in mid-2007 imparting a further one-off increase in prices. MAS therefore shifted to a modest and gradual appreciation path and re-centred the policy band upwards twice over 2010–11, while macroprudential measures were deployed to dampen increases in property and car prices. This had the effect of lowering inflation, even as it helped to secure financial stability. MAS recognised that some shifts in relative prices had to occur in order to facilitate economic restructuring, and had calibrated policy such that it would only "temper, but not fully offset" the inflationary impact of restructuring.

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[2] The decline in relative prices over 1974–1980 in part reflects a smaller rise in Singapore's price level vis-à-vis some regional countries in the immediate aftermath of the two oil price shocks. As a small open economy, economic activity in Singapore was also more severely affected by the global slowdown that ensued, which led to a sharper decline in inflation relative to trading partners.

After peaking in 2013, the S$REER has been on a mild declining trend, even as the S$NEER appreciated modestly. Relative prices in Singapore fell and more than offset the increases in the S$NEER. In April 2016, MAS flattened the slope of the S$NEER policy band as global and domestic developments led to a persistent downdrift in Singapore's growth and inflation outlook. After reverting to an appreciation path in April 2018, the S$NEER policy band was recentred at its lower prevailing level and flattened in April 2020 in response to the outbreak of the COVID-19 pandemic.

4 Characterising Singapore's Headline Inflation Drivers with an SVAR

Over the past 50 years, a number of factors—oil price shocks, global inflation movements, domestic economic factors and MAS' exchange rate policy decisions—have been important drivers of inflation dynamics in Singapore. Given this, a structural vector autoregression (SVAR) model is used to decompose headline inflation movements into these fundamental drivers for the period Q1 1975 to Q4 2020, and to empirically estimate the effects of shocks to each of them on domestic inflation.[8]

$$\begin{pmatrix} \Delta Oil_t \\ \pi_t^F \\ \Delta GDP_t \\ \pi_t \\ \Delta NEER_t \end{pmatrix} = \alpha + \sum_{s=0}^{\infty} A_{t-s} \begin{pmatrix} \epsilon_{t-s}^{OIL} \\ \epsilon_{t-s}^{EXT} \\ \epsilon_{t-s}^{SUPPLY} \\ \epsilon_{t-s}^{DEMAND} \\ \epsilon_{t-s}^{MP} \end{pmatrix}$$

The SVAR contains five endogenous variables—the change in oil prices ΔOil_t, weighted headline CPI inflation of several of Singapore's key trading partners π_t^F, Singapore's GDP growth ΔGDP_t, domestic CPI-All Items inflation π_t and changes in the S$NEER, $\Delta NEER_t$. These variables depend on contemporaneous and past values of the five drivers, or "structural shocks"—oil shocks ϵ_{t-s}^{OIL}, external CPI shocks ϵ_{t-s}^{EXT}, domestic aggregate supply shocks ϵ_{t-s}^{SUPPLY}, domestic aggregate demand shocks ϵ_{t-s}^{DEMAND} and exchange rate policy shocks ϵ_{t-s}^{MP}. Estimation of the SVAR is effected using quarterly data on the annualised values of the five endogenous variables.

To identify the effects of the five structural shocks on macroeconomic variables, the following restrictions were applied, drawing from established results in the SVAR literature.

1) Oil prices depend only on oil shocks, a common identification assumption for SVARs (e.g., Bjornland, 2001), reflecting the low statistical correlation between oil prices and global economic variables.

2) External CPI inflation only depends on oil shocks and other external shocks, reflecting Singapore's status as a small open economy with negligible influence on global economic outcomes.

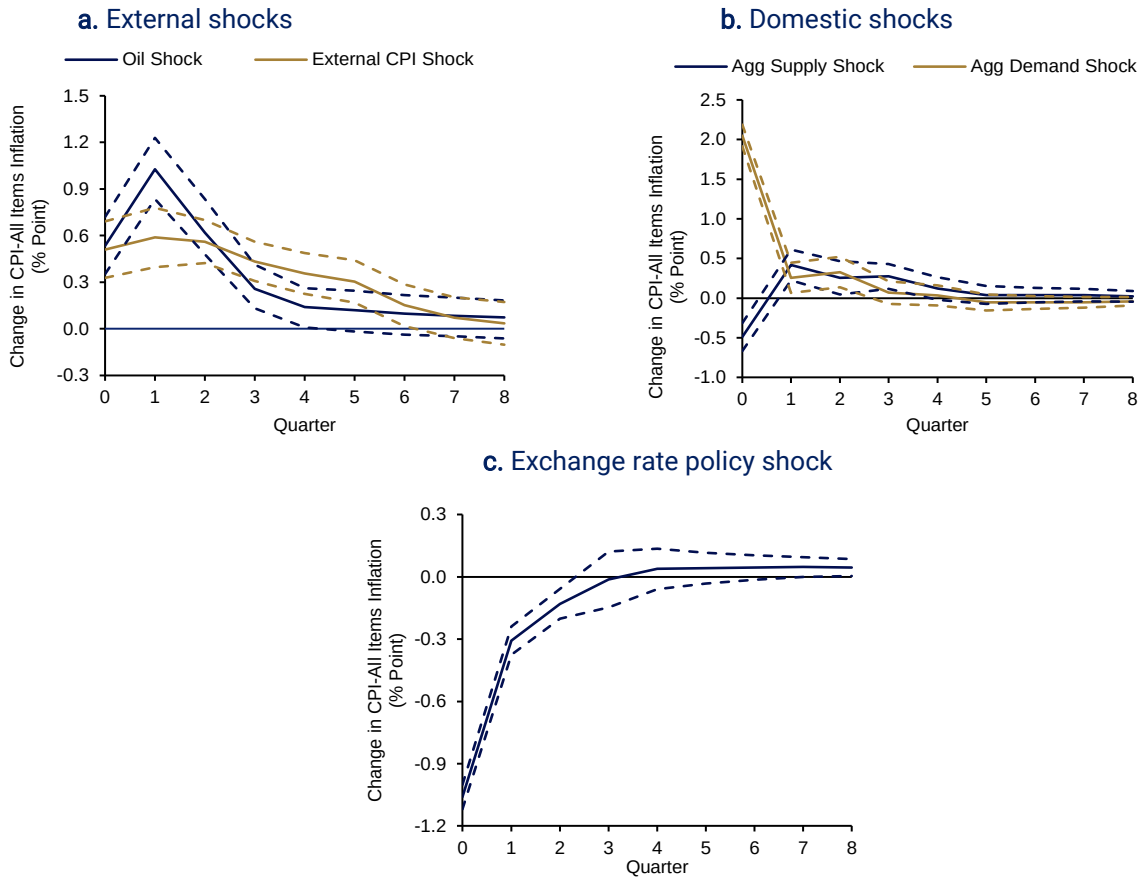
3) Domestic aggregate demand shocks and exchange rate policy shocks have no long-run impact on GDP growth. This reflects the assumption that the Phillips Curve is vertical in the long run; neither monetary shocks nor cyclical demand shocks can have a permanent impact on the output gap. This assumption was introduced by Blanchard and Quah (1989), and variants of it have been commonly used in the estimation of SVARs.

4) Exchange rate policy shocks have no contemporaneous effect on Singapore's GDP growth, reflecting the lagged effects of monetary policy on output, a short-run restriction that originates from the seminal paper of Sims (1980) and applied to the SVAR context in Gali (1992).

[8] The SVAR analysis starts from 1975, rather than 1971, due to limitations in data availability for a number of variables in the model specification.

The estimated effects of one standard deviation positive innovations in the five structural shocks on CPI All-Items inflation, for eight quarters, are presented in **Chart 6**.[9]

Chart 6 Impulse response functions of structural shocks on CPI All-Items inflation



Source: EPG, MAS estimates

Note: The effect of a one-time, one standard deviation positive innovation to each structural shock on CPI All-Items inflation is plotted on each panel of the chart. The bands represent 95% confidence intervals for asymptotic standard errors.

The top left panel illustrates the effects of oil and foreign CPI shocks on domestic headline inflation. Both shocks lead to a temporary rise in inflation. The effects peak one quarter after the initial shock, with headline inflation rising by about 1% point and 0.6% point in response to an oil shock and a foreign CPI shock respectively. The higher initial pass-through from oil shocks to headline inflation compared to foreign CPI shocks reflects the greater direct exposure of domestic CPI components to global oil prices than to (general) foreign prices. However, oil shocks have less persistent effects on domestic inflation, with the impact fading after four quarters, compared to six quarters for foreign CPI shocks. Oil shocks typically dissipate quickly as unexpected changes in oil prices usually induce mitigating supply-side responses from international producers, and as domestic users adjust behaviour.

The effects of domestic aggregate supply shocks and aggregate demand shocks on inflation are depicted in the top right panel. A positive aggregate supply shock raises potential

[9] When restricting the sample to the more recent period, the estimated impulse response functions generally have the same shapes as those presented on Chart 6, although the magnitudes of the effects vary slightly for some variables.

output in Singapore, inducing deflationary pressures upon impact as aggregate supply temporarily exceeds aggregate demand. After one quarter, the positive effect of the aggregate supply shock on domestic GDP growth translates to a temporary and small rise in inflation, which dissipates after a further two quarters. A positive shock to aggregate demand, for example in the form of an unexpected tax cut, leads to a rise in inflation by around 2% points within the same quarter. In line with predictions from a Keynesian macroeconomic model, in which demand shocks should generate a one-time permanent increase in the price level, the SVAR results show that the inflation effect is short-lived and fades after around two quarters.

An exchange rate policy shock that causes the S$NEER to appreciate lowers headline inflation by around 1% point in the same quarter. The negative impact on inflation is largest during the contemporaneous quarter, with the effect petering out thereafter and vanishing after two quarters. The results suggest that a positive shock to the S$NEER can effectively lower domestic inflationary pressures by filtering out foreign import prices and reducing factor prices.

Next, separate econometric analysis of MAS' monetary policy reaction function suggests that the central bank's actions are consistent with a forward-looking rule that has the S$NEER as the intermediate target, with the objectives of stabilising expected changes in MAS Core Inflation and minimising deviations from potential output. The estimates show that a 1% point rise in expected inflation engenders a response of a 1.7% point appreciation in the S$NEER, while a 1% point increase in the output gap induces a 0.9% point appreciation in the S$NEER. The larger size of the coefficient for inflation vis-à-vis the output gap suggests that monetary policy in Singapore has placed a relatively high degree of importance on maintaining low and stable inflation. For details on the estimation of a Taylor-type Rule for Singapore, refer to the **Technical Appendix**.[10]

5 Conclusion

Overall, since the formalisation of MAS' new framework in 1981, exchange rate-centred monetary policy has been very effective in attaining price stability, by reducing the level and volatility of domestic inflation, and contributing to low and stable inflation expectations. Over the past five decades, Singapore has generally kept inflation lower than most advanced and regional economies, while avoiding extended deflationary episodes that can undermine confidence in the economy.

Nevertheless, the ongoing COVID-19 pandemic, in causing simultaneous demand and supply shocks that are difficult to disentangle, has presented renewed challenges to monetary policy. Disruptions to global supply chains and labour markets have led to marked inflationary pressures in the major advanced economies and in some regional economies, while it remains unclear if the pandemic has led to scarring and a permanent loss in potential output. Continuing uncertainties over both inflation and economic growth during the recovery phase of the pandemic have complicated central banks' path to monetary policy normalisation. Even as central banks in the advanced economies have generally taken a patient approach to the withdrawal of policy accommodation, there remains a risk that COVID-19 may have induced longer-term shifts in inflation trends. A transitory shock could

[10] A similar estimation of Singapore's monetary policy rule was done in IMF (2018).

lead to rising inflation expectations, and the slippage of the expectations anchor may result in more persistent inflationary pressures.

Climate risks present another set of challenges to medium-term price stability. More frequent extreme weather events wrought by climate change may impact price formation via a few channels, including through supply-side shocks to food production. Yet, the complex relationships between climate change, relative prices and inflation expectations remain poorly understood, presenting challenges for central banks with inflation mandates, including MAS. The emerging priority for MAS and other central banks is therefore to quantify the frequency, likelihood and size of climate change effects, as well as to incorporate climate risk into their analytical toolkits. These efforts will better equip monetary policy to respond to the threats posed by climate change to core price stability objectives.

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Technical Appendix: MAS' Implied Policy Reaction Function

This appendix presents an econometric analysis to show that over the past three decades, MAS' policy actions are consistent with a forward-looking rule that employs the S$NEER as the intermediate target, with the aim of stabilising expected inflation and minimising the output gap.

As noted by McCallum (2006), MAS' implementation of monetary policy is very similar to that of other central banks, except that its policy management involves periodic adjustments in the exchange rate, rather than a short-term nominal interest rate.[11] Parrado (2004) followed up on this insight by deriving an analogous form of the usual Taylor Rule to accommodate MAS' unique monetary policy framework.[12] This rule sets the y-o-y changes in the S$NEER at a level consistent with stabilising expected inflation over the medium term and maintaining output at potential, and can be represented by the following reduced form equation:

$$\Delta NEER_t = \delta + \beta(E[\pi_{t+n}] - \pi^*) + \gamma(E[y_{t+m}]) + \varepsilon_t$$
$$= \alpha + \beta(E[\pi_{t+n}]) + \gamma(E[y_{t+m}]) + \varepsilon_t$$

where $\Delta NEER_t$ is the y-o-y change in the S$NEER, π is the y-o-y MAS Core Inflation rate, π^* is the inflation target, α is the constant and y is the output gap. $E[\cdot]$ denotes the expectations of a variable at time $t+n$ or $t+m$. The equation is estimated using the Generalised Method of Moments (GMM) on quarterly data over the period Q2 1992 – Q4 2019.[13] Lags of MAS Core Inflation, the output gap, the S$NEER and the 3-month S$ SIBOR are utilised as instruments. The forward-looking horizon for expected core inflation is 6 quarters ($n = 6$) in the equation above and the output gap enters contemporaneously ($m = 0$). All the estimated coefficients are highly significant and of the correct sign, except for the constant α (Table 2).

Table 2 MAS reaction function, Q2 1992 – Q4 2019

	Coefficient	Standard Error	P-value
Constant (α)	−0.927	1.016	0.364
Expected Inflation (β)	1.692	0.689	0.016
Output Gap (γ)	0.873	0.180	0.000

Source: EPG, MAS estimates

Note: Based on the Hansen test, the J-statistic (p-value = 0.231) shows that the over-identifying restrictions are valid. The Durbin-Wu-Hausman test also does not reject the null hypothesis that there is no endogeneity among the regressors (p-value = 0.464).

The results show that a 1% point rise in expected inflation induces a 1.7% point appreciation in the S$NEER, implying that the real exchange rate is temporarily altered to affect aggregate demand, and consequently, core inflation. The estimates suggest that MAS also responds to deviations from potential output, with a 1% point increase in the output gap

11 McCallum, B (2006), "Singapore's Exchange Rate-Centred Monetary Policy Regime and its Relevance For China", MAS Staff Paper, No. 43.

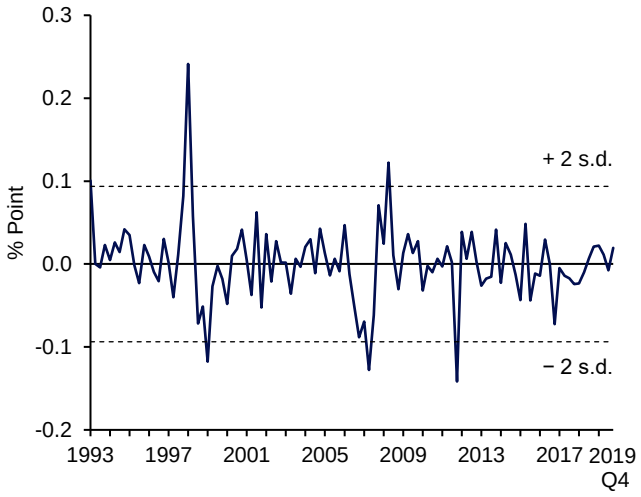
12 Parrado, E (2004), "Singapore's Unique Monetary Policy: How Does It Work?", MAS Staff Paper, No. 31.

13 The sample period is limited by the availability of potential GDP estimates, which start only in Q3 1991. The time period of estimation is further reduced due to the use of lagged variables.

engendering a 0.9% point appreciation in the S$NEER. Additionally, the relative size of the coefficient for inflation vis-à-vis the coefficient for output suggests that monetary policy in Singapore has placed a relatively high degree of importance on maintaining low and stable inflation.

The policy prescribed by the estimated Taylor rule tracks actual policy fairly well. Forecast errors have mostly remained within two-standard error bands over the past 28 years **(Chart 7)**. Significant deviations from the estimated policy rule occurred on only four occasions, and for only one or two quarters, in 1993, 1998–1999, 2007–2008 and 2011, mainly during periods of significant volatility in the global financial system such as the AFC and the Eurozone sovereign debt crisis of 2011.

Chart 7 Deviations of the S$NEER from the estimated Taylor rule



Source: EPG, MAS estimates

Special Feature B

Monetary Policy Strategy Review: The Fed and the ECB

Stephen Cecchetti and Kermit Schoenholtz[1]

1 Introduction

When the ECB began operation in 1999, many observers focused on its differences from the Federal Reserve. Perhaps the most widely cited distinction is the one between the ECB's "hierarchical mandate" (which sets price stability as its primary goal) and the Fed's "dual mandate" (which puts price stability and full employment on an equal footing).

Yet, since the start, the two central banks were much alike. The most obvious similarity is their governance structure. In both, monetary policy decisions belong to a group that combines a small core (the ECB's Executive Board and the Federal Reserve's Board of Governors) and a larger number of regional representatives (the heads of the Euro Area national central banks and the US Reserve Bank presidents).

Over the past two decades, the ECB and the Fed have learnt a great deal from each other, furthering convergence. One example is the evolution of their transparency policy and communications tools. Indeed, the ECB now publishes meeting summaries analogous to the Fed's minutes, while the Fed chair now holds a post-policy meeting press conference, something the ECB has done from the start. The two central banks also faced common shocks—including the GFC of 2007–2009 and the ongoing pandemic—that led them to introduce similar tools, including forward guidance and large-scale asset purchases.

Against this background, it is unsurprising that the broad monetary policy strategies in the US and the Euro Area have converged as well. In August 2020, the Fed revised its longer-run goals, and less than a year later the ECB published the culmination of its most recent strategy review.[2]

If past is prologue, observers will exaggerate the lingering disparities. Perhaps most obviously, unlike the Fed, the ECB's strategic update did not introduce an averaging framework in which they would "make up" for past errors. Nevertheless, we suspect that it will be difficult to distinguish most Fed and ECB policy actions based on the modest differences in their strategic frameworks. For the most part, both revised strategies codify existing practice, as they permit extensive discretion in how each will employ their growing array of policy tools. And, going forward, both central banks likely will continue to face strong forces promoting convergence: these include common policy objectives, long-term global trends, global financial fluctuations, and shared analytical methods.

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[2] For the Fed, see https://www.federalreserve.gov/monetarypolicy/files/fomc_longerrungoals.pdf, and for the ECB, see https://www.ecb.europa.eu/home/search/review/html/index.en.html.

In our view, the key drivers of policy differences between the two central banks will remain the distinctive financial and fiscal systems in which they operate: unlike the ECB, the Fed conducts its operations mostly in "safe" assets that trade in a deep and liquid financial market. And, when it comes to countering deflationary threats, the Fed needs to coordinate its action with just one powerful fiscal agent—the US Treasury—rather than the governments of 19 member states.

In the remainder of this Special Feature, we summarise what we see as the principal outcomes of the two strategy reviews.

2 Changes in the Federal Reserve's Policy Strategy

Starting with the Federal Reserve, the Federal Open Market Committee (FOMC)'s policy strategy update incorporates two key changes: a shift to flexible average inflation targeting (FAIT) and a move to a patient shortfall strategy. FAIT represents a shift in the direction of price-level targeting in which the FOMC intends to make up for past inflation misses, while the patient shortfall approach is embedded in the shift from focusing on employment "deviations" to "shortfalls." The second of these conveys a reduced willingness to act pre-emptively against inflation when the unemployment rate (u) declines below estimates of its sustainable level (u^*).

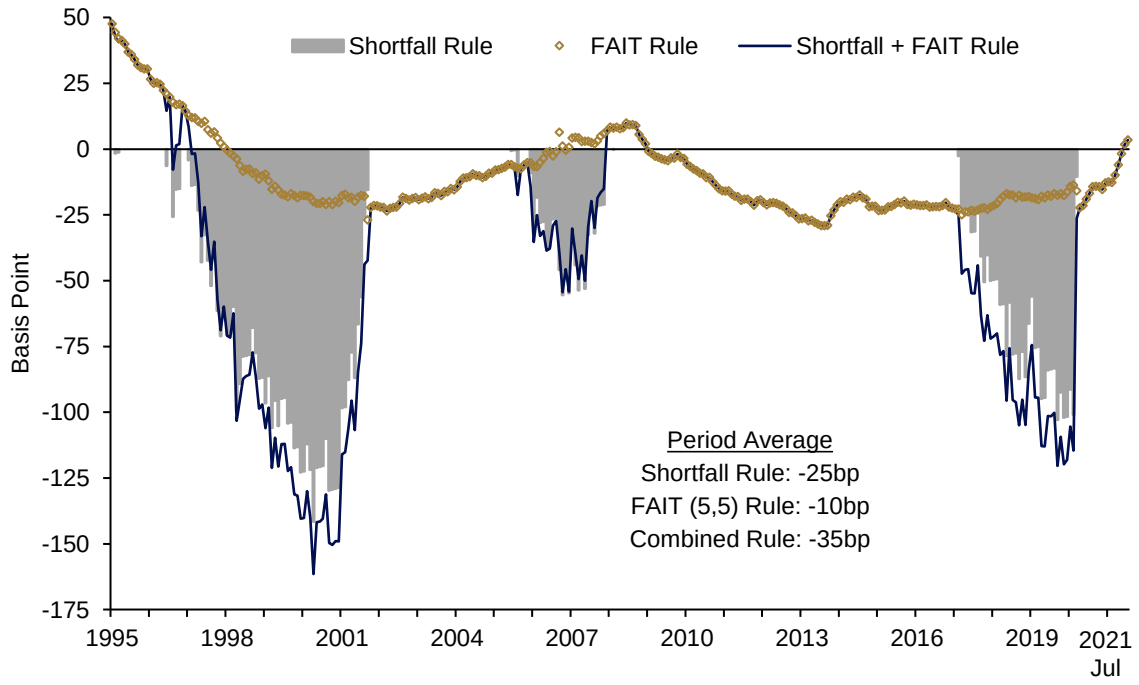
To be effective, the FOMC needs to explain what these two changes mean for the determinants of policy. For example, FAIT implies that the FOMC's short-term inflation objective will change over time: to influence behaviour, the Fed will have to explain their changing objective in a way that everyone understands.[3] Absent such details, observers may worry about further changes of strategy whenever inflation veers significantly from the long-run average target. Similarly, having downgraded the role of the labour market as a predictor of inflation and promised *patience*, policymakers will need to explain how it aims to control inflation going forward.

We do some simple calculations to compare the practical importance of these two strategic shifts. **Chart 1** shows the results of our basic calculations. We take the observed inflation and unemployment readings since 1995 as given for each of three strategies: the patient shortfall rule, the FAIT rule, and a combination of the two. In each case, the chart plots the deviations of the Fed policy rate from that of a simple Taylor rule that uses the unemployment rate gap ($u - u^*$) as the measure of resource utilisation.[4]

[3] Specifically, the FOMC will have to tell us the period over which they are doing the averaging and how it is split into its backward- and forward-looking parts. That is, in computing average inflation, we need to know both how far they will be looking back and how long they expect it to take to recover to the average. So far, they have been silent on these parameters.

[4] For further discussion, see Cecchetti and Schoenholtz (2018).

Chart 1 Deviations of Fed policy rate from a simple u^*-based Taylor rule



Source: FRED and authors' calculations

Note: The baseline Taylor rule is $i = r^* + \pi + 0.5(\pi - \pi^*) - 1.0(u - u^*)$, where i is the policy rate, r^* is the equilibrium short-term real rate, π is annual inflation, π^* is the inflation target, u is the unemployment rate, and u^* is the natural rate of unemployment. The FAIT rule uses the price index of personal consumption expenditures excluding food and energy. We use the Congressional Budget Office measure of the natural rate of unemployment for u^*.

Looking at **Chart 1**, the grey-shaded area shows the consequences of the shortfall rule. Specifically, this reflects the consequence of altering the Taylor rule by setting the impact of unemployment deviations to zero whenever the unemployment rate is below the natural rate of unemployment ($u < u^*$). This patient shortfall strategy is explicitly asymmetrical: the policy rate is equivalent to the original Taylor rule level when u is at or above u^*, otherwise it is lower by the gap between u and u^*.

The FAIT rule (shown as the gold diamonds in **Chart 1**) varies from the simple rule by altering the target inflation rate. Instead of a fixed 2% associated with standard inflation targeting, under FAIT, the inflation target varies by the amount required to return average inflation to 2% over the full target averaging period. For example, if FAIT implies a medium-term inflation target of 2.5% (rather than 2%), the rule subtracts 25 basis points from the simple policy rule, reflecting the coefficient of 0.5 on the inflation gap in the Taylor rule. Constructing a FAIT rule requires that we define both the historical look-back period and the target restoration time window: consistent with a 10-year average inflation targeting regime, we use 5 years for both. Shortening the restoration window would add to the variability of the implied medium-term inflation target, but the deviations from the simple rule would increase by only half as much.

Looking at **Chart 1**, we see that FAIT would have had a very modest impact on policy rates over the period since 1995. The average deviation is −10 basis points, with a standard deviation of 15 basis points. By contrast, the patient shortfall rule reduces the policy rate by 25 basis points on average, with a standard deviation of 39 basis points. As a benchmark for

comparison, the average deviation since 1995 of the monthly effective federal funds rate from the simple Taylor rule is −36 basis points with a standard deviation of a whopping 187 basis points.

The most important message is the difference between the two rules. Despite the attention that FAIT is receiving, the patient shortfall rule has a bigger average impact. Moreover, its effect is far larger when u is below u^*, reaching a minimum of −141 basis points (April 2000), compared to −28 basis points for the FAIT only strategy (September 2001).

The rationale to adopt this patient shortfall rule is likely that the FOMC no longer has confidence in the usefulness of a low unemployment rate for predicting inflation. We share this scepticism. Even so, the Committee still needs a model of inflation if it is to avoid significantly overshooting their long-run average objective. The inherently backward-looking nature of the patient shortfall rule raises this risk.

Aside from inflation risks, another issue that could add to controversy is the impact of the patient shortfall rule on financial stability. The two large "shortfall" episodes of the past 25 years—1997–2001 and 2006–2007—correspond to a stock market boom and a housing boom. Both subsequently gave way to damaging busts, with the latter triggering the GFC. Taylor (2009) blames "monetary excesses" for the housing boom. The timing and impact of a patient shortfall rule would add force to his argument.

While low interest rates are a potential source of financial stability risks, we see macroprudential tools—especially capital and liquidity requirements—as the primary tools for preventing instability. At the same time, following several years in which US authorities relaxed measures intended to build resilience, advocates of monetary policy patience should be especially wary of threats to the financial system associated with persistent low interest rates.

We are sympathetic to the modifications in the FOMC's policy strategy that promote patience and that focus on average inflation. Whether these evolutionary changes bring improvements depends critically on the ability of the Committee to clarify both their medium-term inflation objective and to elaborate their strategy for addressing unpleasant upside inflation surprises. In other words, for the combination of FAIT and the patient shortfall strategy to be effective in maintaining price stability and maximum sustainable growth, the FOMC will need first to agree and then to communicate a complex, time-varying approach to setting monetary policy. For a committee of 19 people, this is a difficult, but not insurmountable, task.

3 Notable Changes in the ECB's Policy Strategy

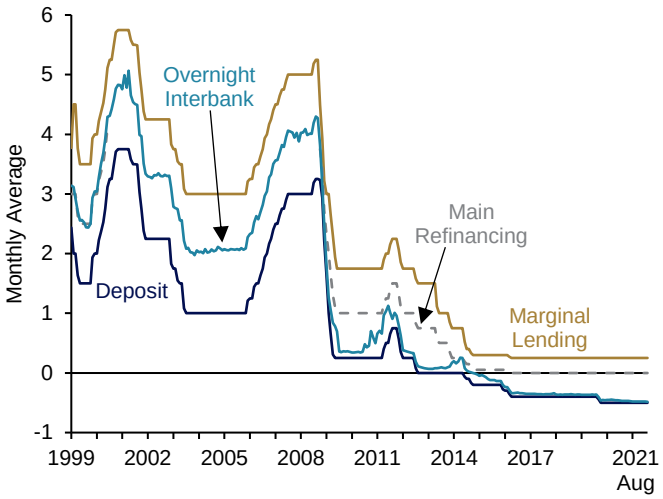
Turning to the ECB, we see three notable changes: target 2% inflation over the medium term, symmetrically and unambiguously; integrate climate change into the framework; and outline a plan to introduce owner-occupied housing (OOH) into the price index they target (the Euro Area Harmonised Index of Consumer Prices (HICP)).[5] While the new strategy can help the ECB achieve its price stability mandate, in our view the overall impact of the revisions is likely to be modest.

[5] For a definition of the HICP, see https://www.ecb.europa.eu/stats/macroeconomic_and_sectoral/hicp/html/index.en.html.

Starting with the strategic motivations, the most important are the same as the ones that drove the Fed's review: the long-term declines in both inflation and real interest rates that lowered equilibrium nominal interest rates and prompted long episodes of policy rates at or below zero.

Indeed, as **Chart 2** below highlights, the ECB has kept its deposit rate (dark blue line, equivalent to the Fed's interest rate on reserve balances) below zero since mid-2014. Faced with extended periods with the policy rate at or below zero, the central bank needs additional tools (including forward guidance and balance sheet measures) to achieve its stabilisation objectives. It also probably needs cooperation from other policymakers—including fiscal and regulatory authorities.

Chart 2 ECB policy rates



Source: ECB

The ECB traces part of this enduring downshift of policy rates to long-run structural trends (including demographics and globalisation) that lowered the global equilibrium real (or natural) rate of interest, known as r^*, by between 1.5 and 2% points.[6] But it also reflects the failure of aggressive monetary stimulus—including negative interest rates, forward guidance, and the purchase of trillions of euros of bonds—to bring Euro Area inflation back to target. As **Chart 3** demonstrates, even with the ECB's deposit rate at or below zero, the five-year Euro Area inflation rate has been below 2% since 2012.

Against this background, the revisions to the ECB's strategic framework are designed to enhance its stabilisation tools in the absence of conventional interest rate policy space. With policy rates likely to be stuck at or below zero for extended periods, the strategy makes clear that formerly unconventional tools like forward guidance, longer-term refinance operations, negative interest rates, and asset purchases are now conventional.

[6] See the Federal Reserve Bank of New York's estimates here: https://www.newyorkfed.org/research/policy/rstar, and the discussion in Cecchetti and Schoenholtz (2020).

Chart 3 Euro Area inflation

Source: Eurostat

For similar reasons, the new strategy sets the ECB's inflation target unambiguously at 2%. The previous asymmetric objective of "below, but close to 2%" encouraged some to view 2% as an inflation cap, rather than a norm. Perhaps as a result, inflation expectations lingered below 2%, limiting the central bank's ability to lower real interest rates.

Against this background, it is perhaps surprising that the ECB did not take the next step and follow the Fed in introducing a make-up strategy to help raise inflation expectations following long periods of sub-target price increases. Like price-level targeting, the FAIT aims explicitly for a period of above-target inflation to correct for past shortfalls (and vice versa for past inflation overshoots). The impact on inflation expectations fosters stabilising swings in the real interest rate, even with the policy rate stuck at zero.

Instead, as the new ECB strategy makes explicit, ongoing emphasis on the medium term continues to allow policymakers a great deal of latitude to achieve comparable results.[7] As in the Fed's case, we think the key word is "patience." According to the strategy statement, for example, following "an adverse supply shock, the Governing Council may decide to lengthen the horizon over which inflation returns to the target level in order to avoid pronounced falls in economic activity." Or, in another circumstance at the effective lower bound: "faced with large adverse shocks the ECB's policy response will […] include an especially forceful use of its monetary policy instruments" that may "imply a transitory period in which inflation is moderately above target." Given this wide degree of discretion, just as with the Fed's new strategy, what observers come to expect about future inflation will depend largely on the ECB's actions in coming years.

The ECB's revised strategy addresses many other points, including the need for cooperation with fiscal policymakers amid deeply adverse shocks, the "complementarity" of price stability and full employment, and the importance of financial stability considerations. Again, for the most part, the framework is consistent with greater convergence with Fed policy. A particularly good example of this is in the ECB's revised analytic approach that

7 The complete statement of the ECB's new monetary policy strategy is here: https://www.ecb.europa.eu/home/search/review/html/ecb.strategyreview_monpol_strategy_overview.en.html.

explicitly drops the "two-pillar" scheme where monetary analysis using measures of money served as a "cross check" on the economic analysis based on everything else. The new "integrated" structure, which is largely consistent with practices in place for some time, focuses on a broad assessment of both economic developments, on the one hand, and of monetary and financial developments, on the other. In the ECB's case, the latter aims explicitly at assessing financial stability and possible impediments to monetary policy transmission.[8]

In one notable area—addressing climate change—the ECB's strategy is more explicit than the Fed.[9] However, the plans—which focus on improving economic modelling, developing new indicators regarding the climate footprint of intermediaries, considering climate risks for the financial system, and ensuring climate neutrality for the assets on the central bank's balance sheet—are consistent with recent Fed evolution in this area. Indeed, in a virtually parallel development earlier this year, the Fed created both a Supervision Climate Committee and a Financial Stability Climate Committee to ensure the resilience of US intermediaries and the financial system.[10]

One additional, largely technical, element of the new ECB strategy, is worth mentioning: the plan to change the measurement of inflation itself. Unlike most advanced economies, the ECB's key metric for price stability—the HICP—does not incorporate OOH. In contrast, for the US, the imputation of rent to owners (something that we cannot directly observe) is the largest single component of the consumer price index—accounting for nearly 24% of the total and 30% of the ex-food-and-energy component.[11]

Discussions about including OOH in the HICP are at least 15 years old.[12] In our view, there are strong theoretical and practical reasons for moving decisively in this direction. Indeed, with parts of the Euro Area facing an extended house price boom amid persistently low interest rates, households may come to question the credibility of the HICP as a measure of inflation.[13]

Fortunately, Eurostat now publishes an index (unlike the US imputed rent measure) based on actual transaction prices for new homes. In recent years, inflation in this OOH measure exceeded that of the HICP by nearly 2% points annually. Depending on its weight, including OOH could have a significant impact on the HICP.[14]

For now, however, the ECB's strategy regarding OOH seems largely aspirational. While the framework review includes a plan to incorporate quarterly developments in the cost of

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8 See Slide 10 in Schnabel (2021).

9 See https://www.ecb.europa.eu/press/pr/date/2021/html/ecb.pr210708_1~f104919225.en.html.

10 See Brainard (2021).

11 Due to its large weight, "owners' equivalent rent" plays a central role in statistical measures of US core inflation, including the trimmed mean and the median, so it has significant influence on Fed policy. See Cecchetti and Schoenholtz (2021).

12 See Eiglsperger and Goldhammer (2018), pages 68–79.

13 See Kindermann *et. al* (2021).

14 See Slide 10 in Schnabel (2021). Using the US weight of 24%, Gros and Shamsfakhr (2021) calculate that average annual inflation from Q1 2015 to Q1 2021 rises from 1.09% to 1.56%. However, following Nell *et. al* (2020), who use a 9% weight mentioned in Eiglsperger and Goldhammer (2018), average inflation over the same six-year period rises by only 0.17% point.

housing in its policy deliberations in coming years, there is only a very loose roadmap for adding a specific component to the monthly HICP.

4 Concluding Remarks

This brings us back to where we started. Over the past year, both the Fed and the ECB concluded policy strategy reviews that likely will advance their well-established trend towards convergence. After studying the results of both reviews, our conclusion is that the changes are modest and incremental, largely reinforcing adjustments that accumulated gradually over the past dozen years. Given that central bankers are conservative by nature, it is unsurprising their policy frameworks would evolve slowly.

At the same time, we applaud both the ECB and the Fed for institutionalising their strategic review processes. Indeed, every central bank should have such a periodic review at least once a decade. We look forward to reading the results of the next Fed and ECB reviews five years from now.

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