

# ECONOMIC SURVEY OF SINGAPORE 2019

The illustration depicts a diverse range of economic activities. At the top right, a blue train travels along a track. Below it, a smartphone displays a QR code next to a stack of money. A microscope and laboratory glassware represent science and technology. A construction crane lifts a shipping container, symbolizing trade and infrastructure. A satellite and a wind turbine represent energy and telecommunications. A solar panel and a hand holding a plant seedling signify sustainable development. A magnifying glass focuses on a bar chart, indicating economic analysis. A factory and an oil rig represent manufacturing and resources. A ship and a person with a suitcase suggest logistics and tourism. A handshake and a graduation cap represent commerce and education. A DNA helix and a pill icon point to healthcare. Gears and a cloud with an upward arrow symbolize industry and growth. A computer monitor shows a line graph, and a circuit board represents electronics. A large network of interconnected nodes and lines at the bottom left suggests a complex digital or economic ecosystem.

February 2020

**Ministry of Trade and Industry**  
**Republic of Singapore**

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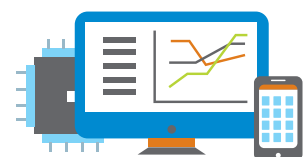
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# MAIN INDICATORS OF THE SINGAPORE ECONOMY

## OVERALL ECONOMY



**GDP**  
at Current  
Market Prices

2018  
\$503.4 billion  
2019  
\$507.6 billion



**GNI**  
Per Capita

2018  
\$80,705  
2019  
\$80,778

## STRUCTURE OF THE ECONOMY IN 2019



Services Producing  
Industries

**70.3%**  
of Nominal VA

Manufacturing

**20.9%**  
of Nominal VA

Goods Producing  
Industries

**25.8%**  
of Nominal VA

Ownership  
of Dwellings

**3.8%**  
of Nominal VA

### Breakdown of Services Producing Industries



Wholesale &  
Retail Trade

**17.3%**  
of Nominal VA



Business  
Services

**14.8%**  
of Nominal VA



Finance &  
Insurance

**13.9%**  
of Nominal VA



Transportation  
& Storage

**6.7%**  
of Nominal VA



Information &  
Communications

**4.3%**  
of Nominal VA



Accommodation  
& Food Services

**2.1%**  
of Nominal VA



Other Services  
Industries

**11.3%**  
of Nominal VA

## LABOUR MARKET



Employment  
(as at year end)

2018  
**3,714.8**  
thousand  
2019  
**3,778.0**  
thousand



Unemployment Rate

2018  
**2.1%**  
2019  
**2.3%**



Value-Added per  
Actual Hour Worked  
(Year-on-Year Growth)

2018  
**3.9%**  
2019  
**-1.5%**

## COST



Unit Labour Cost of  
Overall Economy  
(Year-on-Year Growth)

2018  
**0.3%**  
2019  
**2.8%**



Unit Business Cost  
of Manufacturing  
(Year-on-Year Growth)

2018  
**-7.0%**  
2019  
**-3.0%**



Unit Labour Cost  
of Manufacturing  
(Year-on-Year Growth)

2018  
**-4.1%**  
2019  
**3.2%**

## PRICES



Consumer Price Index  
- All Items  
(Year-on-Year Growth)

2018  
**0.4%**  
2019  
**0.6%**



Domestic Supply  
Price Index  
(Year-on-Year Growth)

2018  
**6.4%**  
2019  
**-3.2%**



Singapore Manufactured  
Products Price Index  
(Year-on-Year Growth)

2018  
**4.4%**  
2019  
**-3.3%**

## MERCHANDISE TRADE



### Merchandise Exports

2018	2019
<b>\$555,665</b> million	<b>\$532,514</b> million
<b>7.9%</b> Year-on-Year Growth	<b>-4.2%</b> Year-on-Year Growth



### Merchandise Imports

2018	2019
<b>\$500,194</b> million	<b>\$487,712</b> million
<b>10.6%</b> Year-on-Year Growth	<b>-2.1%</b> Year-on-Year Growth

### Top Trading Partners in 2019 (Share of Total Merchandise Trade)



**13.4%**  
China



**11.1%**  
Malaysia



**10.9%**  
EU

## SERVICES TRADE



### Services Exports

2018	2019
<b>\$273,305</b> million	<b>\$279,398</b> million
<b>16.6%</b> Year-on-Year Growth	<b>2.2%</b> Year-on-Year Growth



### Services Imports

2018	2019
<b>\$270,483</b> million	<b>\$271,535</b> million
<b>8.4%</b> Year-on-Year Growth	<b>0.4%</b> Year-on-Year Growth

### Top 5 Services Exports Categories in 2019 (Share of Total Services Exports)



**29%**  
Transport  
Services



**28%**  
Other  
Business  
Services



**14%**  
Financial  
Services



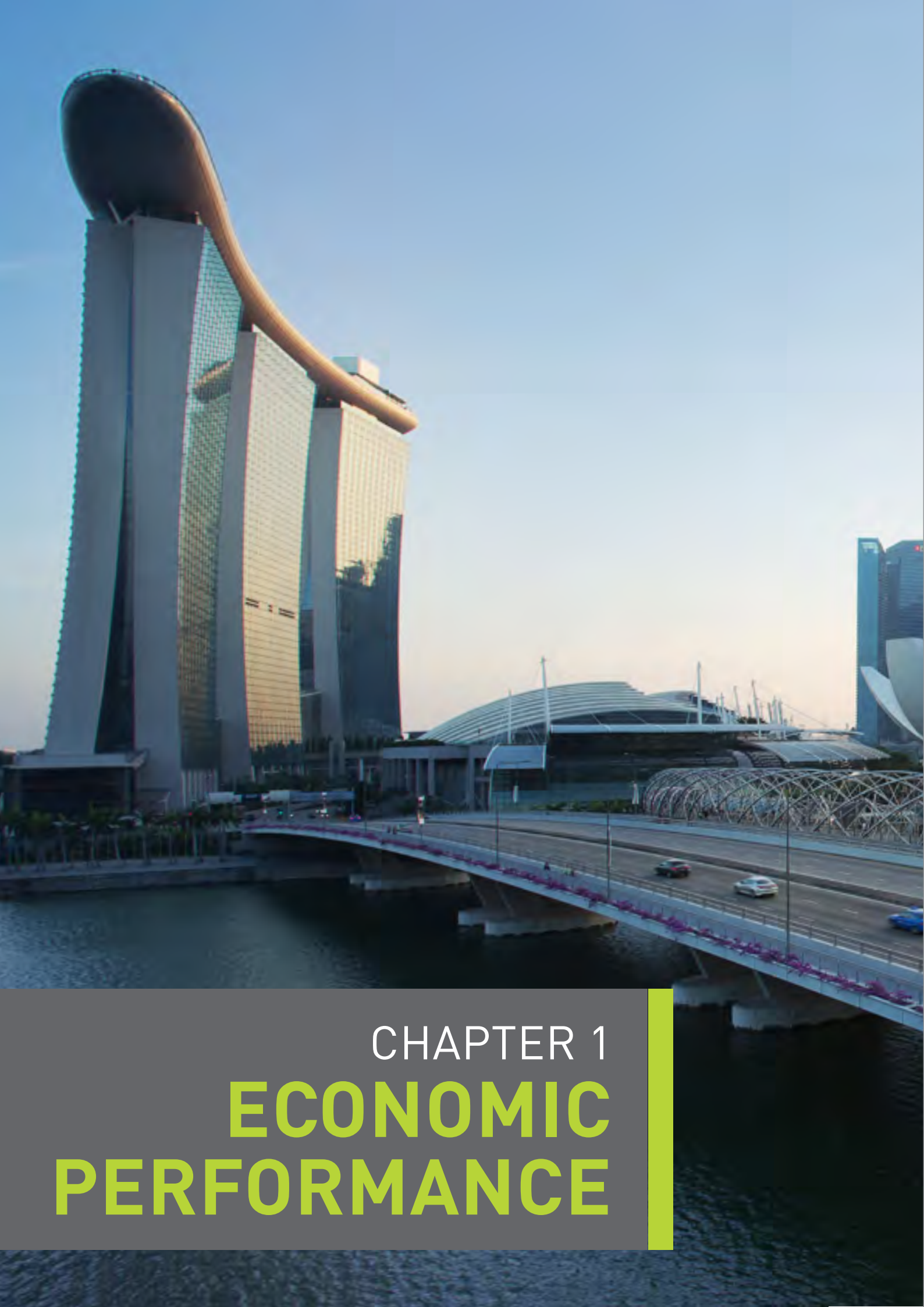
**10%**  
Travel  
Services



**7%**  
Telecomms,  
Computer and  
Information

## TOP 5 TRADING PARTNERS AND SHARE OF TOTAL MERCHANDISE TRADE IN 2019





# CHAPTER 1

# **ECONOMIC PERFORMANCE**

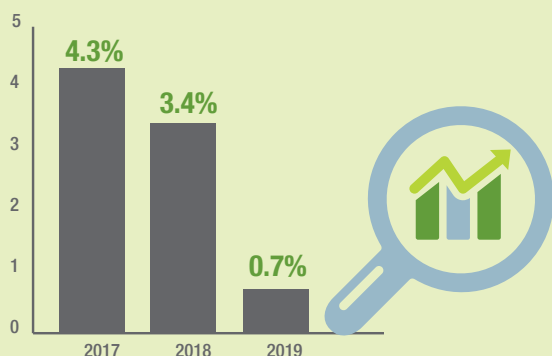




# CHAPTER 1

## ECONOMIC PERFORMANCE

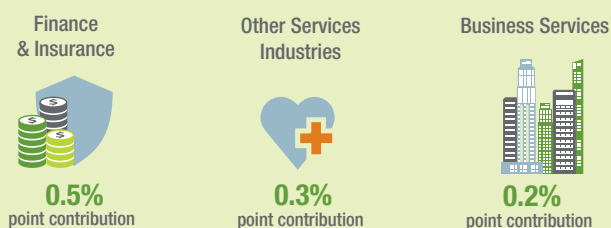
Real GDP grew by  
**0.7%** in 2019



### QUARTERLY GDP GROWTH IN 2019 (Year-On-Year Growth)



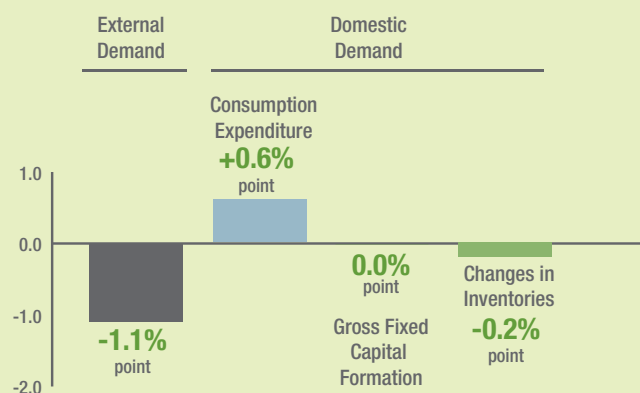
### MAIN DRIVERS OF GDP GROWTH IN 2019



### INCOME COMPONENTS OF GDP IN 2019



### SOURCES OF GROWTH IN 2019





## OVERVIEW

In the fourth quarter of 2019, the Singapore economy grew by 1.0 per cent on a year-on-year basis, faster than the 0.7 per cent growth in the previous quarter. The sectors which contributed the most to growth in the quarter were the finance & insurance sector, the other services industries, and the business services sector.

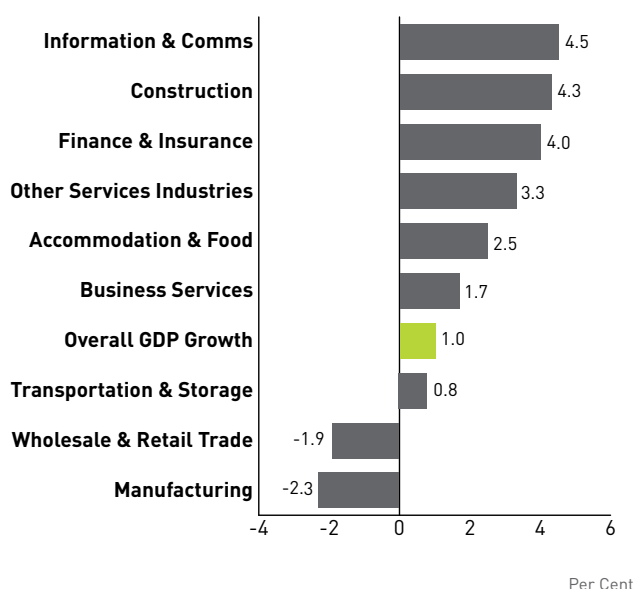
For the whole of 2019, the economy expanded by 0.7 per cent, slower than the 3.4 per cent growth recorded in 2018. The finance & insurance sector was the largest contributor to GDP growth, followed by the other services industries, the business services sector and the information & communications sector.

## OVERALL PERFORMANCE

### Fourth Quarter 2019

The Singapore economy grew by 1.0 per cent year-on-year in the fourth quarter, faster than the 0.7 per cent growth in the previous quarter (Exhibit 1.1). On a quarter-on-quarter seasonally-adjusted annualised basis, the economy expanded at a slower pace of 0.6 per cent, compared to the 2.2 per cent growth in the preceding quarter.

Exhibit 1.1: GDP and Sectoral Growth Rates in 4Q 2019



The manufacturing sector shrank by 2.3 per cent year-on-year in the fourth quarter, extending the 0.7 per cent contraction in the third quarter. The performance of the sector was weighed down by output declines in the electronics, chemicals, transport engineering and general manufacturing clusters.

The services producing industries collectively expanded by 1.5 per cent year-on-year in the fourth quarter, faster than the 0.8 per cent growth in the previous quarter. Among the services sectors, the information & communications sector recorded the strongest growth at 4.5 per cent, followed by the finance & insurance sector (4.0 per cent) and the other services industries (3.3 per cent).

Meanwhile, the construction sector grew by 4.3 per cent year-on-year in the fourth quarter, accelerating from the 3.1 per cent expansion in the third quarter. The growth of the sector was supported by both public sector and private sector construction works.

### Full Year of 2019

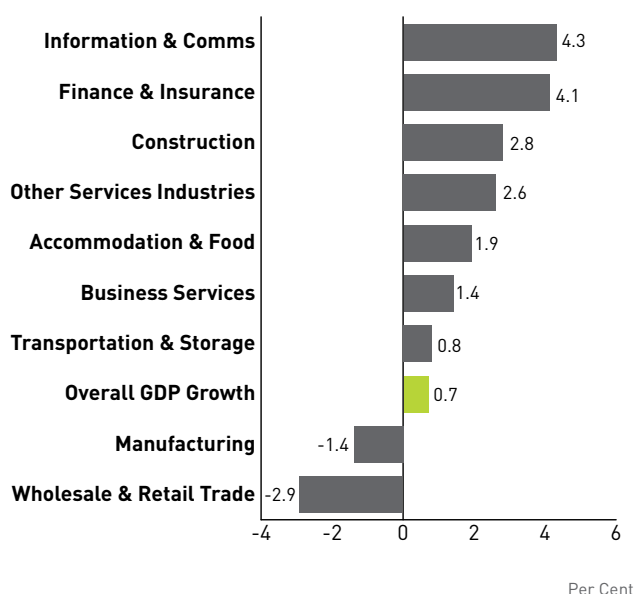
In 2019, the Singapore economy expanded by 0.7 per cent, slower than the 3.4 per cent growth in 2018 (Exhibit 1.2).

The manufacturing sector contracted by 1.4 per cent in 2019, a sharp reversal from the 7.0 per cent growth in 2018. The performance of the sector was pulled down by output declines in the electronics, chemicals, precision engineering and transport engineering clusters.

Services producing industries as a whole grew by 1.1 per cent in 2019, moderating from the 3.4 per cent growth in 2018.

Among the services sectors, the information & communications and finance & insurance sectors registered the fastest pace of growth in 2019. Specifically, the information & communications sector grew by 4.3 per cent, a moderation from the 6.5 per cent growth in 2018. The finance & insurance sector expanded by 4.1 per cent, a slower pace of growth as compared to the 7.2 per cent recorded in 2018.

Exhibit 1.2: GDP and Sectoral Growth Rates in 2019

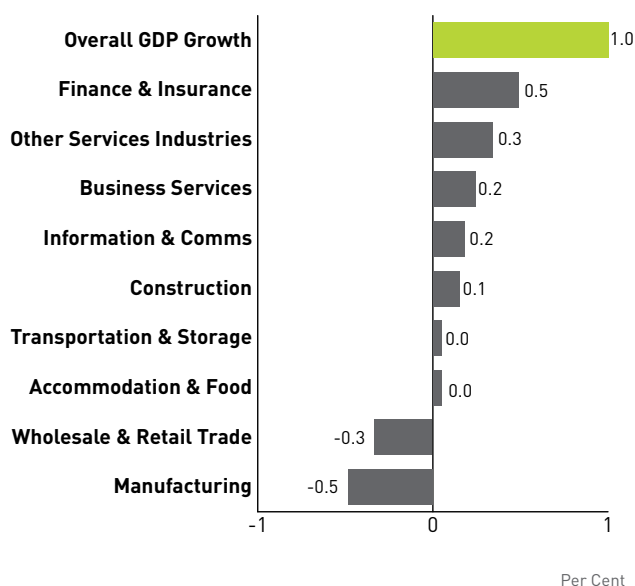


Meanwhile, the construction sector grew by 2.8 per cent in 2019, a reversal from the 3.5 per cent contraction in 2018. Growth in the sector was supported by both public sector and private sector construction works.

## Contribution to Growth

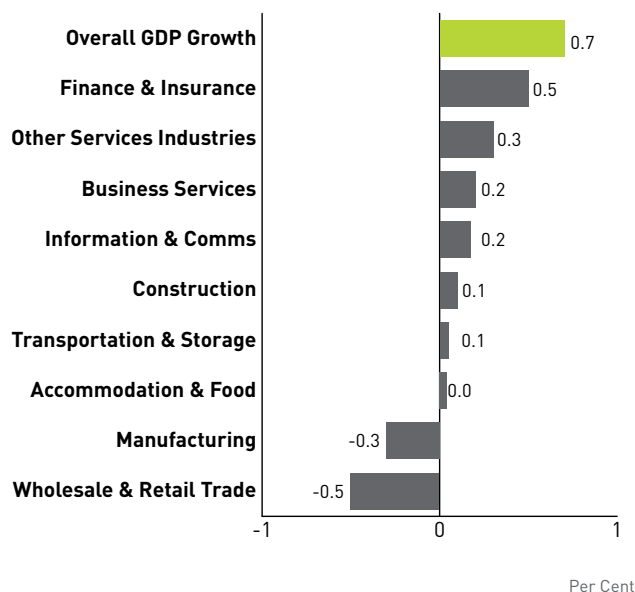
In the fourth quarter, the finance & insurance sector and the other services industries collectively accounted for 82 per cent of overall GDP growth (Exhibit 1.3). All the other sectors also contributed positively to GDP growth in the quarter, except for the wholesale & retail trade and manufacturing sectors.

Exhibit 1.3: Percentage-Point Contribution to Growth in Real GDP in 4Q 2019 (By Industries)



For the whole of 2019, all sectors contributed positively to GDP growth, with the exception of the manufacturing and wholesale & retail trade sectors (Exhibit 1.4). The finance & insurance sector was the largest contributor to GDP growth, at 0.5 percentage-points, followed by the other services industries (0.3 percentage-points), the business services sector (0.2 percentage-point) and the information & communications sector (0.2 percentage-point).

Exhibit 1.4: Percentage-Point Contribution to Growth in Real GDP in 2019 (By Industries)



## SOURCES OF GROWTH

Total demand rose by 1.1 per cent year-on-year in the fourth quarter, reversing the 2.1 per cent decline in the preceding quarter (Exhibit 1.5).

Exhibit 1.5: Percentage-Point Contribution to Total Demand Growth

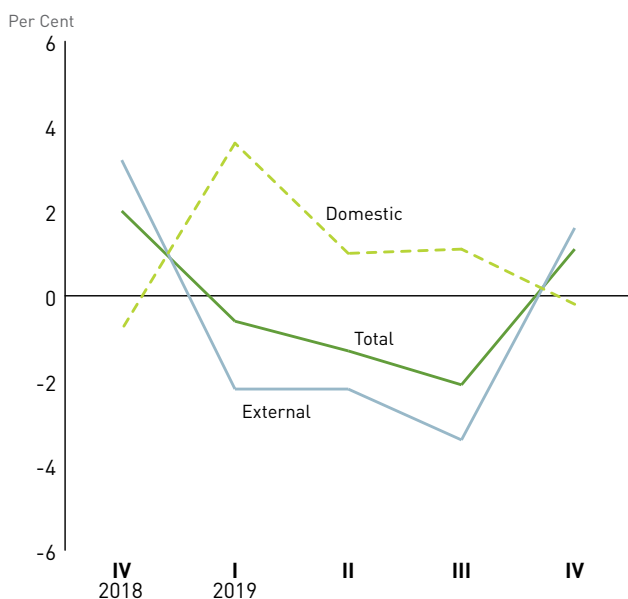
	2018	2019			2019
		II	III	IV	
<b>Total Demand</b>	6.3	-1.3	-2.1	1.1	-0.7
<b>External Demand</b>	5.7	-1.6	-2.5	1.1	-1.1
<b>Total Domestic Demand</b>	0.6	0.3	0.3	-0.1	0.4
<b>Consumption Expenditure</b>	0.7	0.5	0.6	0.5	0.6
Public	0.1	0.0	0.1	0.2	0.1
Private	0.6	0.4	0.5	0.4	0.5
<b>Gross Fixed Capital Formation</b>	-0.4	-0.1	0.2	-0.2	0.0
<b>Changes in Inventories</b>	0.2	-0.1	-0.5	-0.5	-0.2

For the whole of 2019, total demand fell by 0.7 per cent, in contrast to the 6.3 per cent growth in 2018. External demand contributed negatively to total demand growth (-1.1 percentage-points), while the contribution of domestic demand was positive (0.4 percentage-points).

## External Demand

External demand rose by 1.6 per cent year-on-year in the fourth quarter, a turnaround from the 3.4 per cent decline in the preceding quarter (Exhibit 1.6). The increase in external demand was supported by an expansion in the both goods and services exports.

Exhibit 1.6: Changes in Total Demand in Chained (2015) Dollars



For the full year, external demand contracted by 1.6 per cent, a reversal from the 8.1 per cent increase in 2018. The decline in external demand was largely driven by a contraction in real merchandise exports, of which machinery & transport equipment, mineral fuels and manufactured goods were the key contributors to the decline. The fall in real merchandise exports more than offset the increase in real services exports, which was in turn driven by an expansion in the exports of other business services, maintenance and repair services and financial services.

## Domestic Demand

Total domestic demand fell by 0.2 per cent year-on-year in the fourth quarter, a reversal from the 1.1 per cent growth in the previous quarter. The decline in the fourth quarter can be attributed to a contraction in gross fixed capital formation and a draw-down in inventories. By contrast, consumption expenditure expanded slightly to help support total domestic demand.

For 2019 as a whole, total domestic demand rose by 1.3 per cent, moderating from the 1.9 per cent expansion in 2018. The increase in domestic demand for the year was largely due to steady growth in consumption expenditure, which outweighed a drawdown in inventories and a decline in gross fixed capital formation.

## Consumption Expenditure

Total consumption expenditure rose by 3.0 per cent year-on-year in the fourth quarter, moderating from the 3.5 per cent increase in the previous quarter.

For the full year, total consumption expenditure expanded by 3.5 per cent, slower than the 3.9 per cent growth in 2018, as growth in both public and private consumption moderated. Public consumption increased by 2.8 per cent, a slight moderation from the 2.9 per cent growth in 2018. Meanwhile, private consumption grew by 3.7 per cent, slower than the 4.2 per cent increase in 2018. Expenditure on miscellaneous goods & services, housing & utilities and health were the main contributors to private consumption growth for the year.

## Gross Fixed Capital Formation

Gross fixed capital formation (GFCF) declined by 1.7 per cent year-on-year in the fourth quarter, a reversal from the 2.5 per cent expansion in the preceding quarter. The decline can be attributed to private GFCF, which fell by 3.0 per cent in the fourth quarter. On the other hand, public GFCF expanded by 4.5 per cent over the same period.

For 2019 as a whole, GFCF dipped by 0.2 per cent, extending the 3.4 per cent decline in 2018 (Exhibit 1.7). Public GFCF rose by 1.3 per cent, a turnaround from the 4.7 per cent decline in 2018. The increase was largely due to higher investment spending on public construction & works and transport equipment (Exhibit 1.8). Meanwhile, private GFCF fell by 0.5 per cent, extending the 3.1 contraction in 2018. The decline was the result of a fall in investment spending on private machinery & equipment, private transport equipment and private intellectual property products, which more than offset a rise in investment spending on private construction & works.

*Exhibit 1.7: Annual Changes in Gross Fixed Capital Formation in Chained (2015) Dollars, 2019*

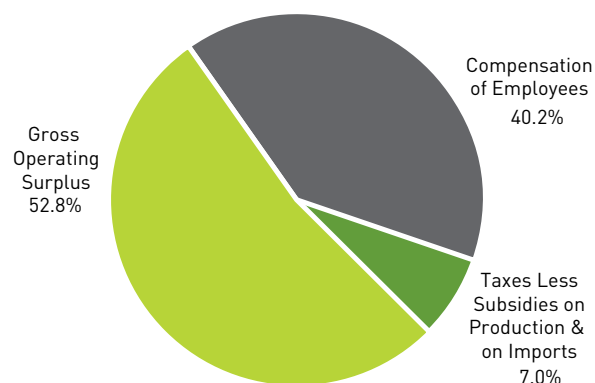
	Total	Public	Private
<b>Total</b>	-0.2	1.3	-0.5
Construction & Works	2.1	3.7	1.2
Transport Equipment	-2.1	17.2	-2.6
Machinery & Equipment	-3.6	-22.4	-2.0
Intellectual Property Products	-0.2	0.8	-0.3

*Exhibit 1.8: Percentage-Point Contribution to Growth of Gross Fixed Capital Formation in Chained (2015) Dollars, 2019*

	Total	Public	Private
<b>Total</b>	-0.2	0.2	-0.4
Construction & Works	0.8	0.5	0.3
Transport Equipment	-0.2	0.1	-0.3
Machinery & Equipment	-0.7	-0.4	-0.4
Intellectual Property Products	-0.1	0.0	-0.1

## INCOME COMPONENTS OF NOMINAL GDP

Singapore's nominal GDP amounted to \$508 billion in 2019, an increase of 0.8 per cent over 2018. Gross operating surplus accounted for 53 per cent of nominal GDP, while compensation of employees accounted for 40 per cent (Exhibit 1.9). Taxes on production and imports (less subsidies) made up the remaining 7.0 per cent of nominal GDP.

*Exhibit 1.9: Income Components of GDP at Current Prices*

## NATIONAL SAVING

With factor income outflows exceeding inflows by \$47 billion, Gross National Income (GNI) came in at \$461 billion, lower than the \$508 billion in nominal GDP.

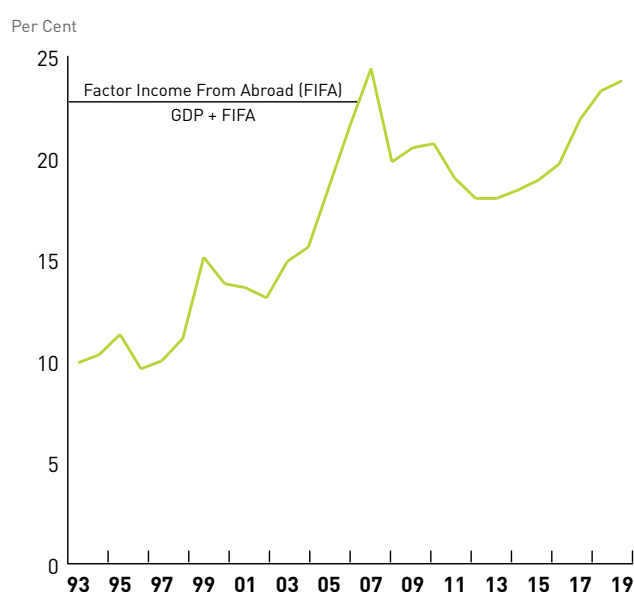
Gross National Savings (GNS) declined by 1.2 per cent to \$212 billion in 2019. This comprised a net outflow of \$86 billion that was lent or transferred abroad, and \$126 billion in Gross Capital Formation. The national savings rate was 46 per cent of GNI in 2019, slightly lower compared to the 47 per cent in 2018.

## GNI AND THE EXTERNAL ECONOMY

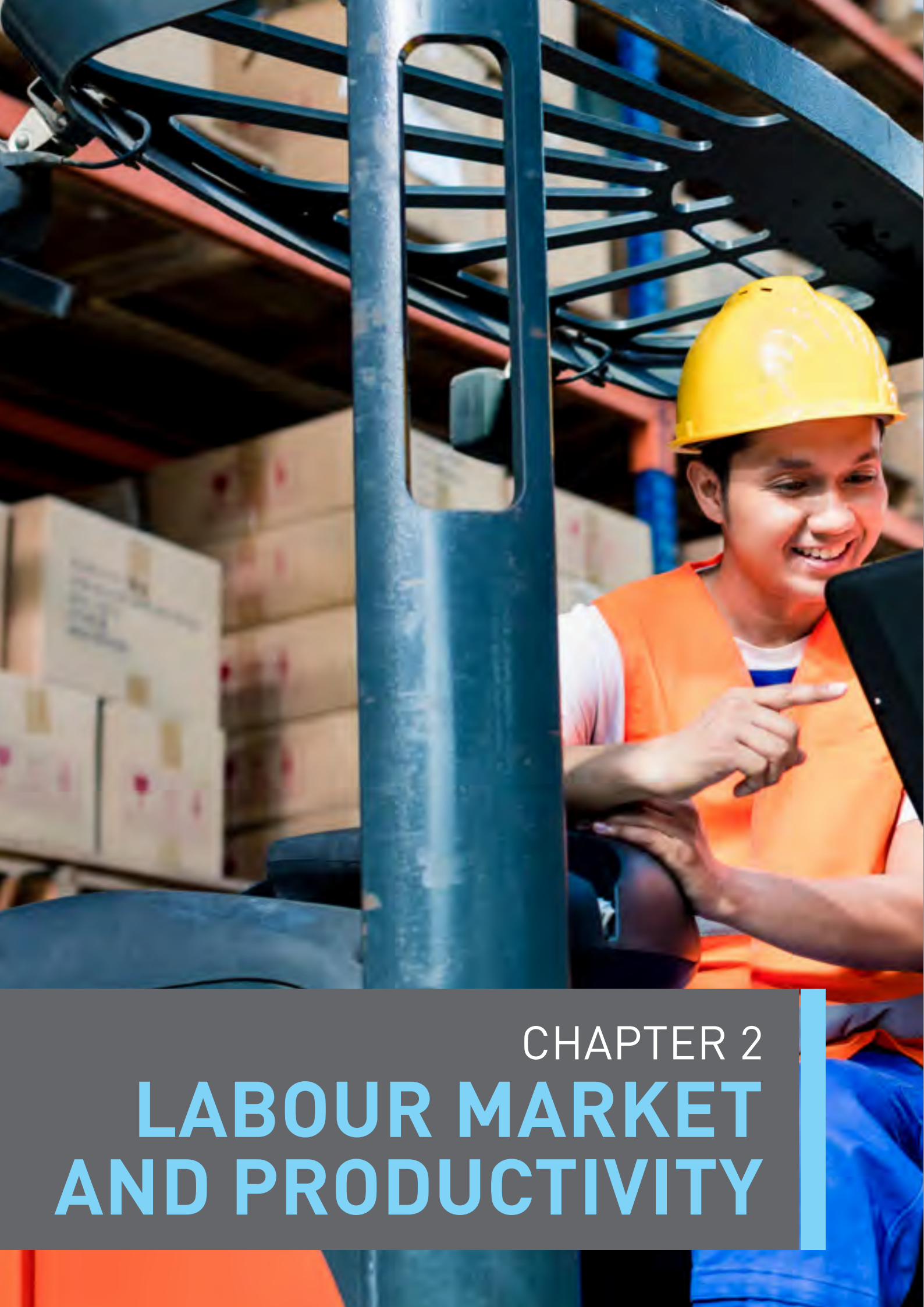
Factor income from abroad reached \$158 billion in 2019, up from \$153 billion in 2018. The contribution of overseas operations to total income was 24 per cent in 2019, a slight increase compared to the 23 per cent recorded in 2018 (Exhibit 1.10).

Based on the Survey of Singapore's Investment Abroad, the stock of direct investment abroad decreased from \$858 billion in 2017 to \$836 billion in 2018.

*Exhibit 1.10: Singapore's Earnings from External Economy as a Proportion of Total Income*







## CHAPTER 2

# LABOUR MARKET AND PRODUCTIVITY

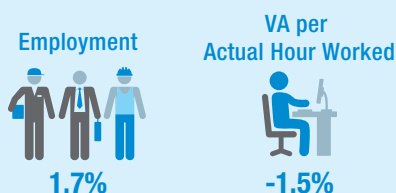




# CHAPTER 2

# LABOUR MARKET AND PRODUCTIVITY

## EMPLOYMENT AND PRODUCTIVITY GROWTH IN 2019



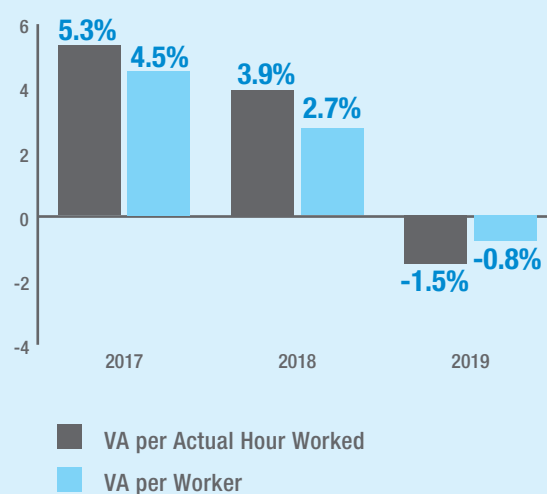
## MAIN DRIVERS OF EMPLOYMENT GROWTH IN 2019



## SECTORS WITH THE HIGHEST VA PER ACTUAL HOUR WORKED GROWTH IN 2019



## VA PER ACTUAL HOUR WORKED AND VA PER WORKER GROWTH

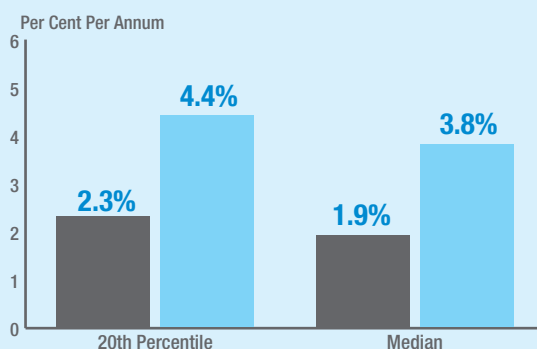


## UNEMPLOYMENT RATES IN 2019



## ANNUALISED CHANGE IN REAL GROSS MONTHLY INCOME FROM WORK

■ June 2009 - June 2014  
■ June 2014 - June 2019



Real median gross monthly income of full-time employed residents rose by **3.8% per annum** from June 2014 to June 2019



## OVERVIEW<sup>1</sup>

Total employment rose by 63,200 in 2019, higher than the 45,300 increase in 2018. Total employment growth was driven by employment gains in the services and construction sectors, while the manufacturing sector continued to register a decline in employment. Excluding Foreign Domestic Workers (FDWs), total employment increased by 55,200 in 2019, with local employment accounting for 26,500 of the increase.

Total retrenchments in 2019 were similar to that in 2018, even as unemployment rates inched up.

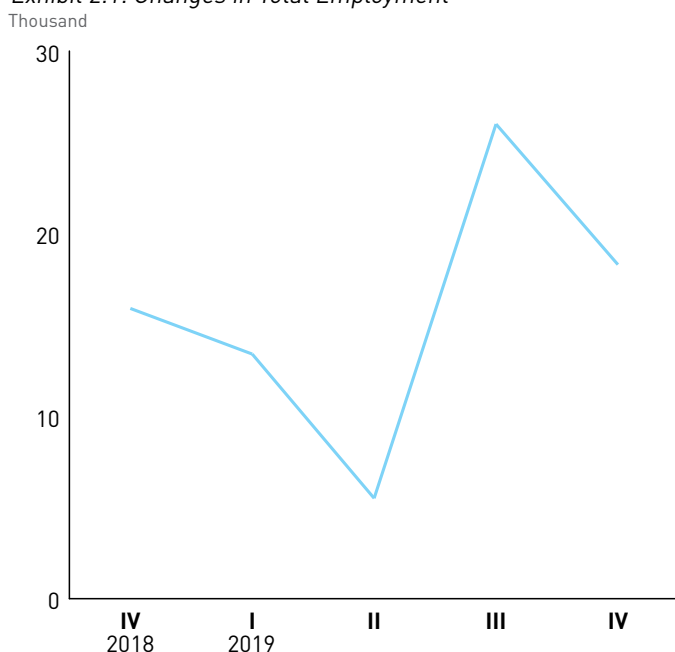
Labour productivity, as measured by real value-added per actual hour worked, declined by 1.5 per cent in 2019, a reversal from the 3.9 per cent growth in 2018. Similarly, real value-added per worker fell by 0.8 per cent, in contrast to the 2.7 per cent increase in 2018.

The real gross monthly income of full-time employed residents at the median and 20th percentile rose faster during the period of 2014 to 2019, as compared to the earlier five-year period of 2009 to 2014.

## EMPLOYMENT

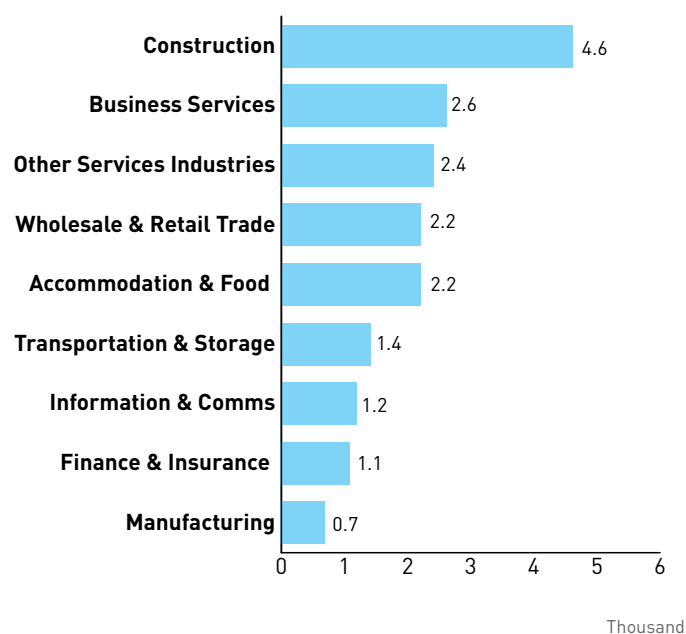
Total employment increased in the fourth quarter (18,300) on the back of seasonal hiring for the year-end festivities. While employment growth in the fourth quarter was lower than the preceding quarter (26,000), it was higher than the same period a year ago (15,900) (Exhibit 2.1). A similar trend was observed for total employment excluding FDWs.

Exhibit 2.1: Changes in Total Employment



Total employment growth in the fourth quarter was supported by a pickup in employment across all broad sectors. Specifically, employment rose in the services (13,000), construction (4,600) and manufacturing (700) sectors. Within the overall services sector, the business services sector and the other services industries saw the largest employment gains (Exhibit 2.2).

Exhibit 2.2: Changes in Employment by Industry in 4Q 2019



<sup>1</sup> Figures for the fourth quarter of 2019 and 2019 are based on preliminary estimates.

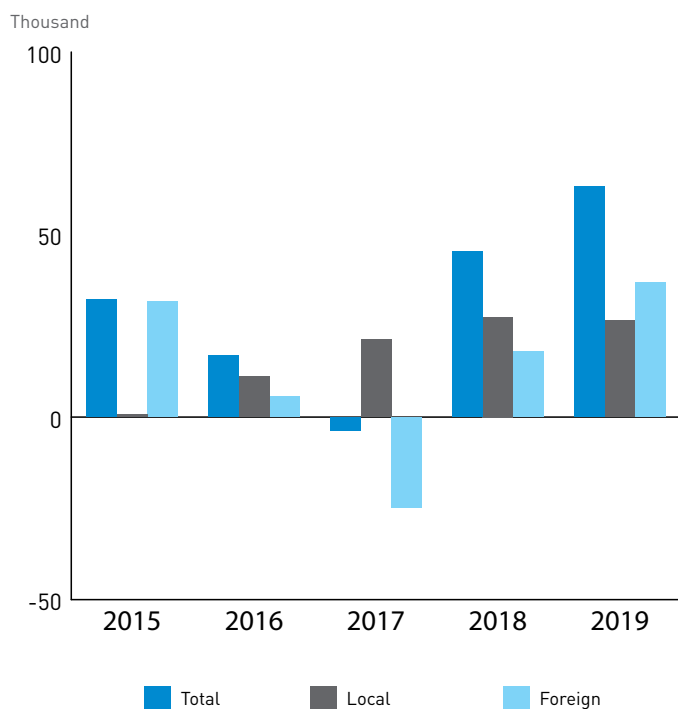
For the whole of 2019, total employment increased by 63,200, extending the growth recorded in 2018 (45,300). Excluding FDWs, total employment growth came in at 55,200. Total employment growth was driven by gains in the services (53,700) and construction (12,800) sectors, even as employment in the manufacturing sector (-3,000) continued to decline.

Local employment rose by 26,500 in 2019, similar to the increase in 2018 (27,400) (Exhibit 2.3). Services sectors such as the other services, professional services and information & communications sectors saw gains in local employment, while the manufacturing sector recorded a decline in local employment.

Meanwhile, foreign employment (excluding FDW) increased by 28,700 in 2019, mainly due to an increase in construction work permit holders. Excluding FDWs and the construction sector, foreign employment growth in 2019 (14,900) would be lower than local employment growth (excluding construction) in 2019 (27,500), and the corresponding foreign employment growth (16,300) in 2018.

As at December 2019, there were 3,778,000 employed persons in Singapore, with 2,355,300 locals and 1,422,700 foreigners. Excluding FDWs, there were 1,160,900 foreigners.

Exhibit 2.3: Changes in Employment by Residential Status



## UNEMPLOYMENT

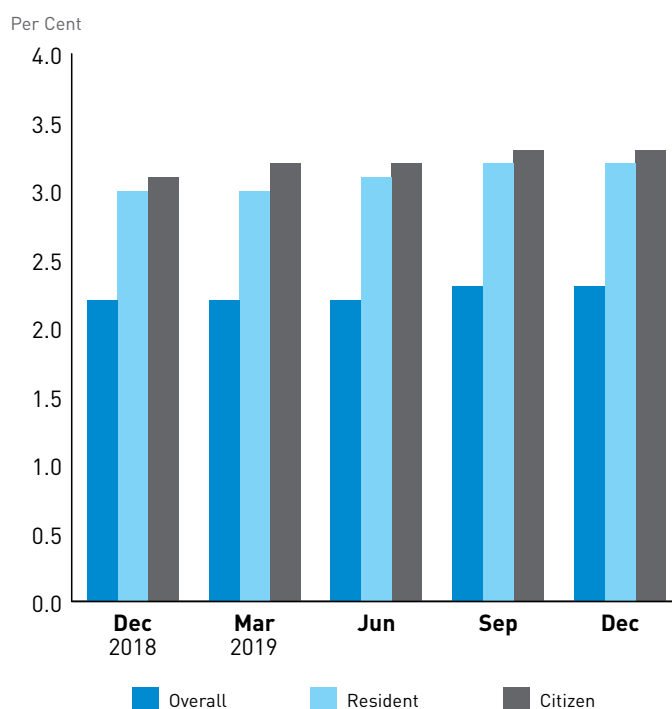
The seasonally-adjusted overall (2.3 per cent), resident (3.2 per cent) and citizen (3.3 per cent) unemployment rates held steady in December 2019, after trending up in the previous quarters (Exhibit 2.4).

In December 2019, there were 72,800 unemployed residents, of whom 62,100 were Singapore citizens. These were lower than the number of unemployed residents (74,200) and citizens (64,600) in September 2019.

The annual average overall unemployment rate rose from 2.1 per cent in 2018 to 2.3 per cent in 2019. Similarly, the unemployment rates for residents and citizens increased from 2.9 per cent to 3.2 per cent, and from 3.0 per cent to 3.3 per cent respectively over the same period.

In 2019, 72,600 residents were unemployed on average, of whom 63,500 were Singapore citizens. The respective figures in 2018 were lower, at 66,900 and 58,900.

Exhibit 2.4: Unemployment Rates (Seasonally-Adjusted)



## RETRENCHMENTS

Total retrenchments came in at around 2,700 in the fourth quarter, slightly higher than the levels recorded in the preceding quarter (2,470) and the same quarter in 2018 (2,510). Over the quarter, retrenchments rose in the services (from 1,690 to 1,800), manufacturing (from 600 to 700) and construction (from 160 to 200) sectors.

For the full year, total retrenchments (10,700) were similar to that observed in 2018 (10,730). However, the trends were mixed across sectors. Retrenchments increased in the manufacturing (from 2,570 to 2,800) and services (from 6,960 to 7,100) sectors, but declined in the construction (from 1,200 to 800) sector.

## PRODUCTIVITY

### Real Value-Added per Actual Hour Worked

Overall labour productivity, as measured by real value-added per actual hour worked, fell by 1.6 per cent in the fourth quarter, larger than the 0.9 per cent decline in the third quarter. Productivity of the construction and other services sectors rose, while that of the accommodation & food services, manufacturing, wholesale & retail trade, information & communications, business services, transportation & storage and finance & insurance sectors declined.

As a whole, the productivity of outward-oriented sectors fell by 2.3 per cent in the fourth quarter, while that of domestically-oriented sectors declined by 0.6 per cent over the same period.

For the full year, real value-added per actual hour worked fell by 1.5 per cent, a reversal from the 3.9 per cent growth achieved in 2018, on the back of the slowdown in economic growth (Exhibit 2.5). Only the construction and finance & insurance sectors experienced growth in real value-added per actual hour worked in 2019 (Exhibit 2.6).

Exhibit 2.5: Changes in Value-Added per Actual Hour Worked for the Overall Economy

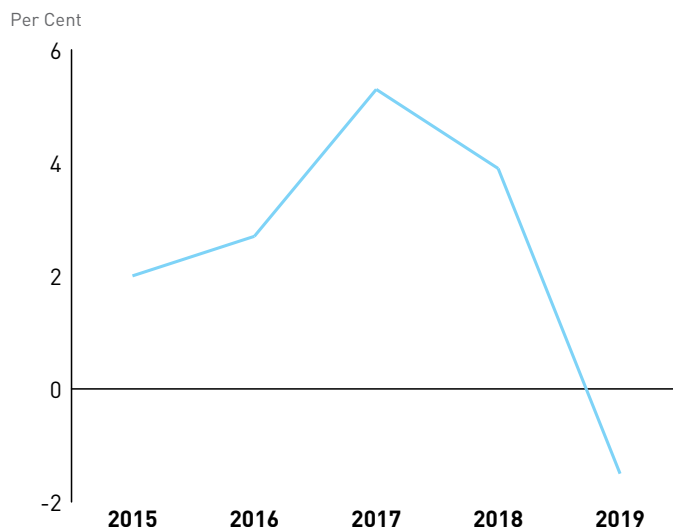
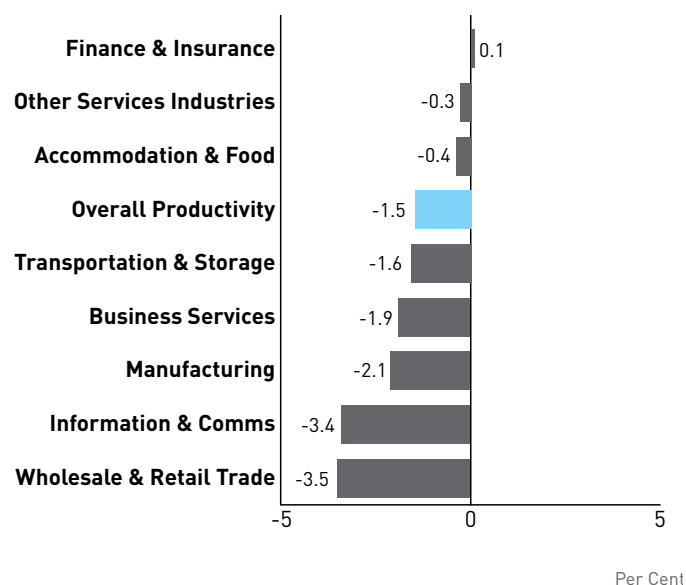


Exhibit 2.6: Changes in Value-Added per Actual Hour Worked by Industry in 2019



## Real Value-Added per Worker

Real value-added per worker fell by 0.6 per cent in the fourth quarter, extending the 0.9 per cent decline in the preceding quarter.

For 2019 as a whole, real value-added per worker edged down by 0.8 per cent, a reversal from the 2.7 per cent growth in 2018.

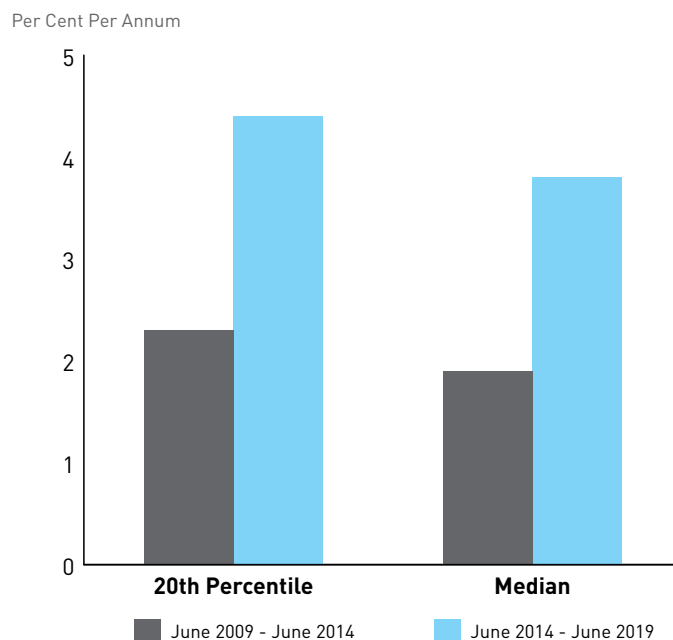
The larger fall in real value-added per actual hour worked compared to real value-added per worker was due to an increase in the actual number of hours worked per worker.

## INCOME FROM WORK

Real median gross monthly income of full-time employed residents rose by 3.8 per cent per annum from 2014 to 2019, doubling the 1.9 per cent per annum increase in the preceding five years (2009 to 2014) (Exhibit 2.7).

Over the same period, real income growth at the 20th percentile (4.4 per cent per annum) was higher than at the median (3.8 per cent per annum), thus narrowing the gap with the median worker. The 20th percentile income growth over this period was also significantly higher than in the preceding five years (2.3 per cent per annum).

*Exhibit 2.7: Annualised Change in Real Gross Monthly Income from Work of Full-Time Employed Residents*









# CHAPTER 3

# **COSTS, INVESTMENTS AND PRICES**





# CHAPTER 3

# COSTS, INVESTMENTS AND PRICES

## INVESTMENT COMMITMENTS IN 2019



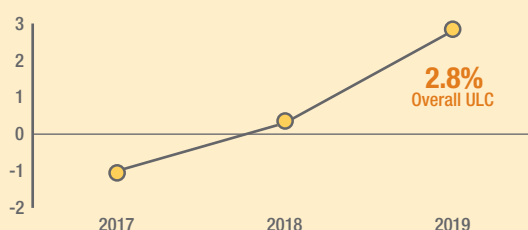
Fixed Asset Investment Commitments

**\$15.2 billion**

Total Business Expenditure Commitments

**\$9.0 billion**

## OVERALL UNIT LABOUR COST



## WITHIN THE MANUFACTURING SECTOR



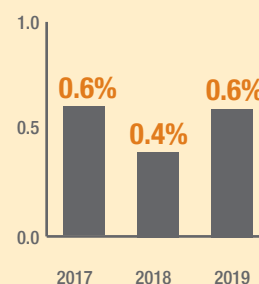
**3.2%**  
in 2019  
Unit Labour Cost

**-3.0%**  
in 2019  
Unit Business Cost



The Consumer Price Index (CPI) increased by  
**0.6%** in 2019

## CPI-ALL ITEMS INFLATION



## CLUSTERS THAT ATTRACTED THE HIGHEST FIXED ASSET INVESTMENT COMMITMENTS



Chemicals



Electronics



Services Clusters

## CLUSTERS THAT ATTRACTED THE HIGHEST TOTAL BUSINESS EXPENDITURE COMMITMENTS



Engineering & Environmental Services



Headquarters & Professional Services



Infocommunications & Media

## THE INCREASE IN CPI WAS MAINLY DRIVEN BY INCREASES IN PRICES OF...

Food



**0.4%**  
point contribution

Education



**0.2%**  
point contribution

## BUT THIS WAS PARTIALLY OFFSET BY DECLINES IN PRICES OF...

Housing & Utilities



**-0.2%**  
point contribution



## OVERVIEW

Overall Unit Labour Cost (ULC) for the economy rose by 2.1 per cent on a year-on-year basis in the fourth quarter of 2019, a moderation from the 3.6 per cent increase in the preceding quarter. For the whole of 2019, the overall ULC increased at a faster pace of 2.8 per cent, compared to the 0.3 per cent recorded in 2018.

Total investment commitments attracted by EDB in the manufacturing and services sectors remained healthy in 2019. The manufacturing clusters attracted a larger amount of fixed asset investment (FAI) commitments, while the services clusters attracted a higher amount of total business expenditure (TBE) commitments.

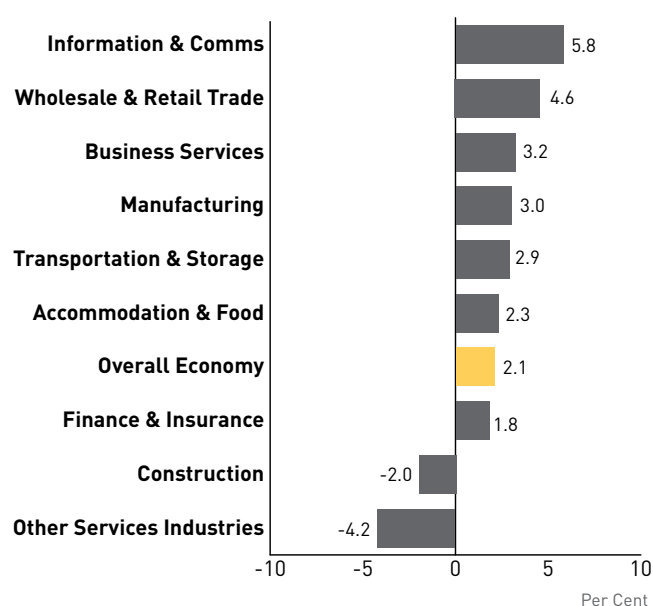
The Consumer Price Index-All Items (CPI-All Items) rose by 0.6 per cent year-on-year in the fourth quarter, slightly higher than the 0.4 per cent increase in the previous quarter. For 2019 as a whole, CPI-All Items inflation came in at 0.6 per cent, up from the 0.4 per cent recorded in 2018.

Producer prices, as measured by the domestic supply price index (DSPI) and the Singapore manufactured products price index (SMPPPI), as well as import prices fell in the fourth quarter. For 2019 as a whole, the DSPI, SMPPPI, import and export price indices declined by 3.2 per cent, 3.3 per cent, 1.0 per cent and 1.4 per cent respectively.

## COSTS

The overall ULC for the economy rose by 2.1 per cent year-on-year in the fourth quarter, a moderation from the 3.6 per cent increase in the third quarter (Exhibit 3.1). The uptick in the overall ULC was due to an increase in total labour cost per worker, along with a fall in labour productivity, as measured by real value-added per worker.

Exhibit 3.1: Changes in Unit Labour Cost in 4Q 2019



By broad sectors, the ULC for the manufacturing sector rose by 3.0 per cent in the fourth quarter, moderating from the 3.4 per cent increase in the preceding quarter.

For the services sector, the ULC picked up by 1.8 per cent, slower than the 3.9 per cent increase in the previous quarter. Most services sectors saw an increase in their respective ULCs during the quarter, with the exception of the other services industries.

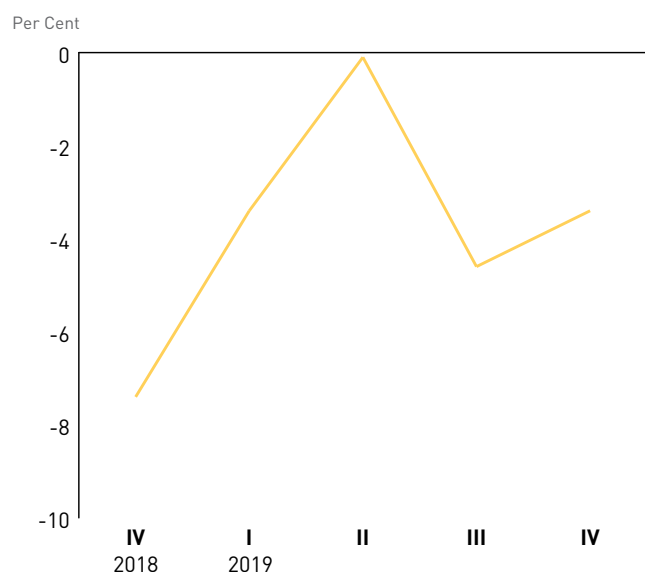
By contrast, the construction ULC fell by 2.0 per cent (the fourth consecutive quarter of decline) as a result of productivity gains in the sector.

For the whole of 2019, the overall ULC rose by 2.8 per cent on account of an increase in total labour cost per worker and a decline in labour productivity.

Manufacturing unit business cost (UBC) fell by 3.4 per cent year-on-year in the fourth quarter, extending the 4.6 per cent decline in the previous quarter (Exhibit 3.2). The drop in the manufacturing UBC was mainly due to a 5.9 per cent fall in unit services cost (which includes royalties, utilities and other services costs such as professional and advertising fees), which more than offset the 3.0 per cent increase in the manufacturing ULC.

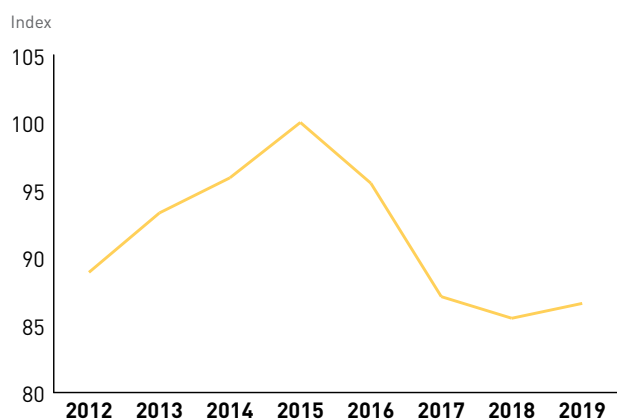
For the whole of 2019, the manufacturing UBC contracted by 3.0 per cent, extending the 7.0 per cent fall in 2018, on account of a sustained decline in unit services cost.

*Exhibit 3.2: Changes in Unit Business Cost for Manufacturing*



Singapore's relative unit labour cost (RULC) for manufacturing – a measure of Singapore's competitiveness against 16 economies<sup>1</sup> – rose in 2019 as compared to 2018 (Exhibit 3.3). The increase was mainly due to an appreciation of the Singapore dollar against the trade-weighted currencies of these economies.

*Exhibit 3.3: Singapore's Relative Unit Labour Cost in Manufacturing Against Selected 16 Economies<sup>1</sup>*



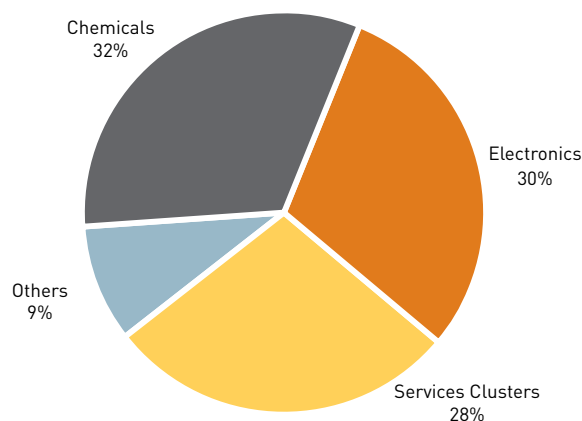
## INVESTMENT COMMITMENTS

EDB attracted healthy levels of investment commitments in 2019, with FAI and TBE commitments coming in at \$15.2 billion and \$9.0 billion respectively.

In terms of FAI, the manufacturing clusters contributed the most amount of commitments, at \$10.9 billion. Within manufacturing, the chemicals cluster attracted the largest amount of commitments, at \$4.9 billion, followed by the electronics cluster, at \$4.6 billion (Exhibit 3.4). Among the services clusters, the engineering & environmental services and research & development clusters contributed the most to total FAI commitments, at \$1.3 billion and \$1.2 billion respectively.

Investors from Europe were the largest source of FAI commitments, at \$7.2 billion (47 per cent). They were followed by investors from the United States who contributed about \$5.7 billion of FAI commitments (38 per cent).

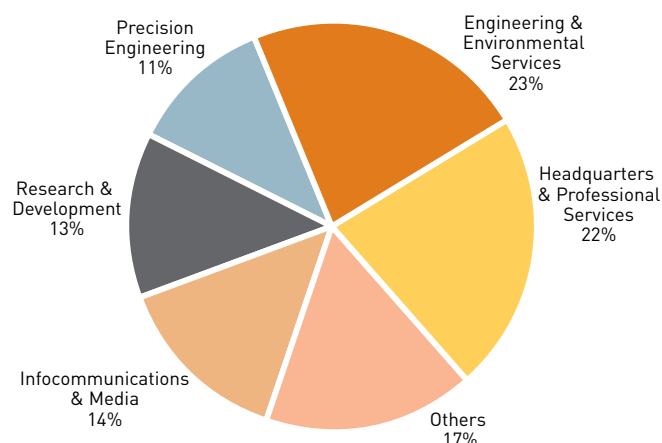
*Exhibit 3.4: Fixed Asset Investments by Industry Clusters in 2019*



For TBE, the services clusters attracted the highest amount of commitments, at \$6.8 billion. This was driven by the engineering & environmental services cluster, which garnered \$2.1 billion in TBE commitments, followed by the headquarters & professional services cluster, with \$2.0 billion. Among the manufacturing clusters, the precision engineering cluster contributed the highest amount of TBE commitments, at \$1.0 billion (Exhibit 3.5).

<sup>1</sup> The 16 economies are Australia, China, France, Germany, Hong Kong, India, Indonesia, Japan, Malaysia, Netherlands, South Korea, Taiwan, Thailand, the United Kingdom, the United States and Vietnam.



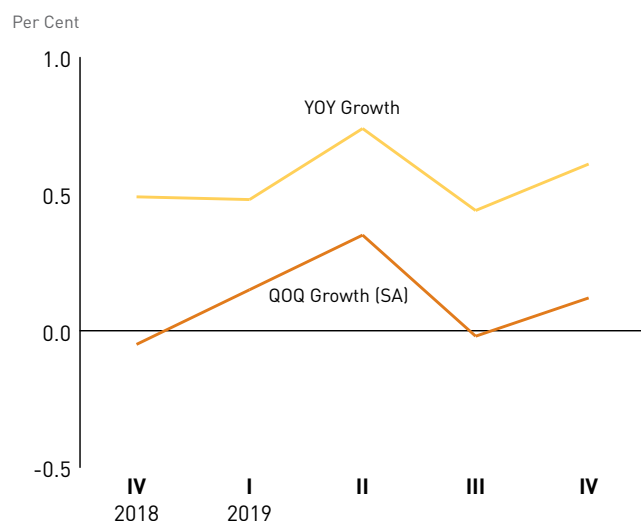
*Exhibit 3.5: Total Business Expenditure by Industry Clusters in 2019*

Investors from the United States contributed the most to total TBE commitments, at \$3.5 billion (38 per cent), followed by investors from Asia Pacific & Others, at \$2.0 billion (22 per cent).

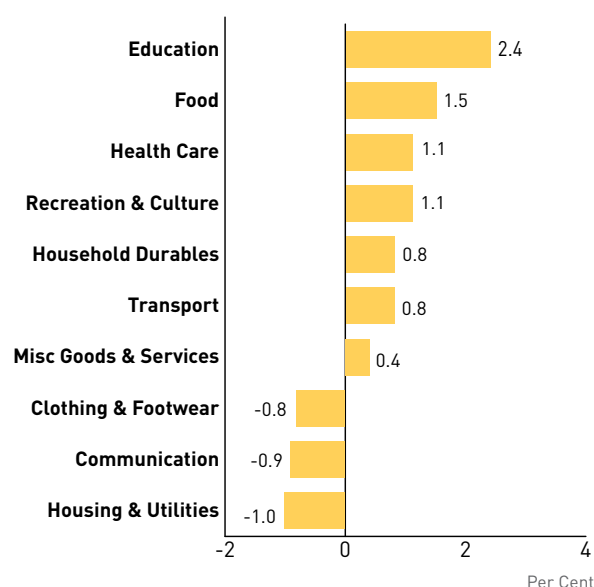
When these projects are fully implemented, they are expected to generate \$29.4 billion of value-added per annum and create more than 32,000 jobs in the coming years.

## CONSUMER PRICE INDEX

Singapore's CPI-All Items increased by 0.6 per cent on a year-on-year basis in the fourth quarter, slightly faster than the 0.4 per cent rise in the third quarter (Exhibit 3.6). On a quarter-on-quarter seasonally-adjusted basis, CPI-All Items inched up by 0.1 per cent, after remaining unchanged in the previous quarter.

*Exhibit 3.6: Changes in Overall CPI*

For 2019 as a whole, CPI-All Items inflation came in at 0.6 per cent, up from the 0.4 per cent recorded in 2018. Among the CPI categories, the largest positive contributor to CPI-All Items inflation was food, with prices rising by 1.5 per cent (Exhibit 3.7) due to an increase in the prices of food servicing services like hawker food and restaurant meals, as well as non-cooked food items such as bread & cereals, vegetables, fruits and fish & seafood.

*Exhibit 3.7: Changes in CPI by Category in 2019*

Education costs increased by 2.4 per cent because of higher fees at commercial institutions, kindergartens & childcare centres, universities and polytechnics. Transport costs edged up by 0.8 per cent as an increase in bus & train fares, car prices and costs of general repair & maintenance more than offset a fall in the prices of motorcycles & scooters. Recreation & culture costs rose by 1.1 per cent on the back of higher holiday travel expenses. Healthcare costs increased by 1.1 per cent due to a rise in the cost of hospital and outpatient services. Prices of household durables & services went up by 0.8 per cent on account of an increase in the salaries and levy for foreign domestic workers. Prices of miscellaneous goods & services rose by 0.4 per cent due to more expensive personal care items.

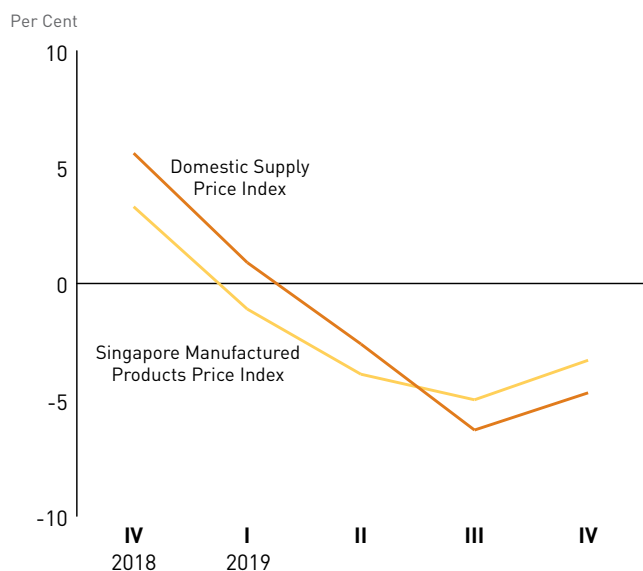
The price gains in these CPI categories were partially offset by price declines in other categories. Clothing & footwear costs fell by 0.8 per cent because of cheaper ready-made garments. Communication costs declined by 0.9 per cent due to the lower cost of telecommunication equipment & services. Housing & utilities costs fell by 1.0 per cent as a decline in accommodation and electricity costs outweighed higher water prices and housing maintenance charges.

## PRODUCER PRICE INFLATION

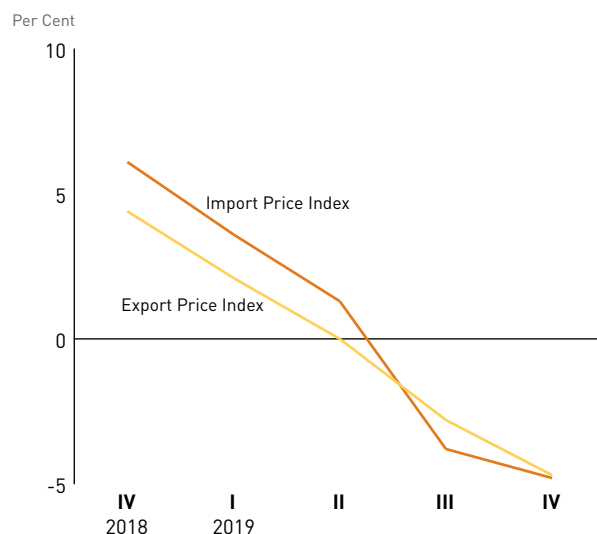
Producer prices - as measured by the DSPI and SMPPI - as well as the import price index fell on a year-on-year basis in the fourth quarter (Exhibits 3.8 and 3.9). These declines could be attributed to a fall in the prices of diesel fuel, kerosene & vaporizing oil and ethylene. Likewise, the export price index fell on account of a drop in the prices of diesel fuel, bunker fuel and high-speed diesel fuel.

For the full year, the DSPI and SMPPI declined by 3.2 per cent and 3.3 per cent respectively, mainly because of a fall in the prices of integrated circuits and diesel fuel. Meanwhile, the drop in the prices of diesel fuel and motor spirit of ron 90-97 contributed to the bulk of the decline in import (-1.0 per cent) and export (-1.4 per cent) prices.

*Exhibit 3.8: Changes in Domestic Supply Price and Singapore Manufactured Products Price Indices*



*Exhibit 3.9: Changes in Import and Export Price Indices*



## BOX ARTICLE 3.1

# Business Cost Conditions in Singapore's Manufacturing and Services Sectors

## OVERVIEW

In 2019, the unit business cost (UBC) for the manufacturing sector fell, while the UBC for the overall services sector rose.

### Definition of UBC



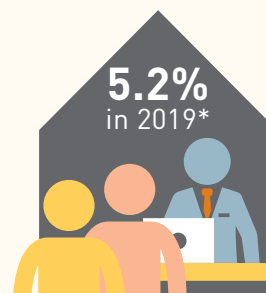
Total Business Cost



Gross Real Value-Added



UBC for Manufacturing



UBC for Services

\*Refers to first 3 quarters of 2019

## KEY DRIVERS

The fall in the manufacturing UBC in 2019 was on account of a decline in the unit services cost.

### Contribution to Manufacturing UBC in 2019



Royalty Payments



Work Given Out



Labour Cost



Others

### Contribution to Services UBC in 2019



Labour Cost



Services Cost

Meanwhile, the increase in the services UBC in the first three quarters of 2019 was driven by higher unit labour cost and other services costs.

## OUTLOOK

Looking ahead, the overall ULC for the economy is likely to continue to increase in 2020. Meanwhile, industrial and commercial rentals are expected to remain subdued, and the costs of utilities, fuel and transportation are likely to be relatively stable.

### UNIT LABOUR COST



Wage growth expected to remain stable

### RENTAL COST



Industrial and commercial rentals to remain subdued

### UTILITIES COST



Utilities cost to remain stable

## BUSINESS COST CONDITIONS IN SINGAPORE'S MANUFACTURING AND SERVICES SECTORS

This article presents the latest business cost structure of the manufacturing and services sectors, recent trends in business costs, as well as the outlook for the key components of business costs.

### (I) Business Cost Structure of Manufacturing and Services Sectors<sup>1</sup>

**Labour cost, royalty payments and “others” are the main components of business costs in the manufacturing sector; labour cost also constitutes a major cost component in the services sector**

For firms in the manufacturing sector, labour cost, royalty payments<sup>2</sup> and “others”<sup>3</sup> constitute the main components of business costs. Collectively, these components account for around 77 per cent of the business costs of small- and medium-sized enterprises (SMEs) and 66 per cent of the business costs of non-SMEs in the sector.

For firms in the services sector, labour cost is also a major cost component, with its share of business costs ranging from around 10 per cent for firms in the transportation & storage sector, to around 39 per cent or more for firms in labour-intensive sectors such as accommodation, food services and retail trade.

For both the manufacturing and services sectors, non-labour production taxes<sup>4</sup> (e.g., property, road and other indirect taxes) account for a very small share of business costs, at less than 1 per cent for SMEs and non-SMEs in most sectors. Please see further details in Annex A.

### (II) Unit Business Cost in the Manufacturing and Services Sectors

**Between 2014 and 2019, unit business cost in the manufacturing sector declined, while unit business cost in the overall services sector rose**

As business costs tend to increase when firms produce a higher amount of output to meet demand, a more pertinent concept is unit business cost, which measures the business costs incurred to produce one unit of output.

Over the five-year period of 2014 to 2019, the unit business cost index for the manufacturing sector (UBCI) fell by 2.4 per cent per annum on a compound annual growth rate (CAGR) basis, with declines seen annually since 2016 (Exhibit 1). In the latest year (i.e., 2019), the UBCI dropped by 3.0 per cent from a year ago.

Meanwhile, the unit business cost index for the overall services sector (UBC-Services Index) increased by 1.3 per cent per annum between 2014 and 2019.<sup>5</sup> In the first three quarters of 2019<sup>6</sup>, the UBC-Services Index rose by 5.2 per cent compared to the same period a year ago (Exhibit 2).

1 Only operating expenses (without material costs and depreciation) are included in business costs. This follows the definition adopted by the Department of Statistics (DOS) in its computation of the Unit Business Cost for Manufacturing. See DOS' Information Paper, "Methodological Review on the Unit Business Cost Index for Manufacturing Industry (Base Year 2010=100)", at <https://www.singstat.gov.sg/-/media/files/publications/economy/ip-e38.pdf>.

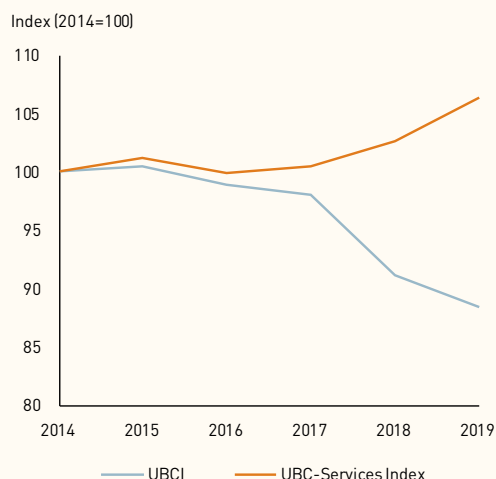
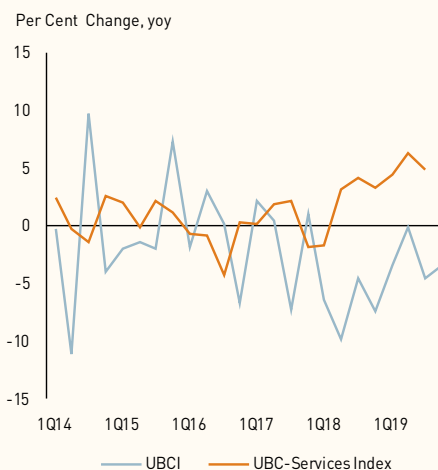
2 Royalty payment refers to payments to another party (the licensor or franchisor who owns a particular asset) for the right to the ongoing use of that asset.

3 "Others" consists of sub-components such as professional fees, advertising, commission and agency fees, sundry expenses etc.

4 Labour-related taxes on production (e.g., foreign worker levy) are classified under labour cost. Taxes on income (e.g., corporate income tax) are excluded.

5 The UBC-Services Index is estimated by MAS to assess cost conditions in the services sector. It is a composite index of proxy cost indicators for each component of business cost, combined using weights estimated from expenditure data in DOS' Services Survey Series 2017: The Services Sector, as well as the 2014 Input-Output tables.

6 Latest available UBC-Services Index is up to the third quarter of 2019.

**Exhibit 1: Manufacturing Sector's UBCI and Services Sector's UBC-Services Index****Exhibit 2: Year-on-Year (YoY) % Change of the UBCI and UBC-Services Index**

Source: Department of Statistics, Monetary Authority of Singapore

Note: The UBC-Services Index for 2019 refers to the average of the first three quarters.

### Labour cost, royalty payments and “others” were the key contributors to unit business cost changes in the manufacturing sector over the last five years

As labour cost, royalty payments and “others” account for a large share of business costs in the manufacturing sector, they were some of the key contributors to manufacturing UBCI changes in the past five years (Exhibit 3).

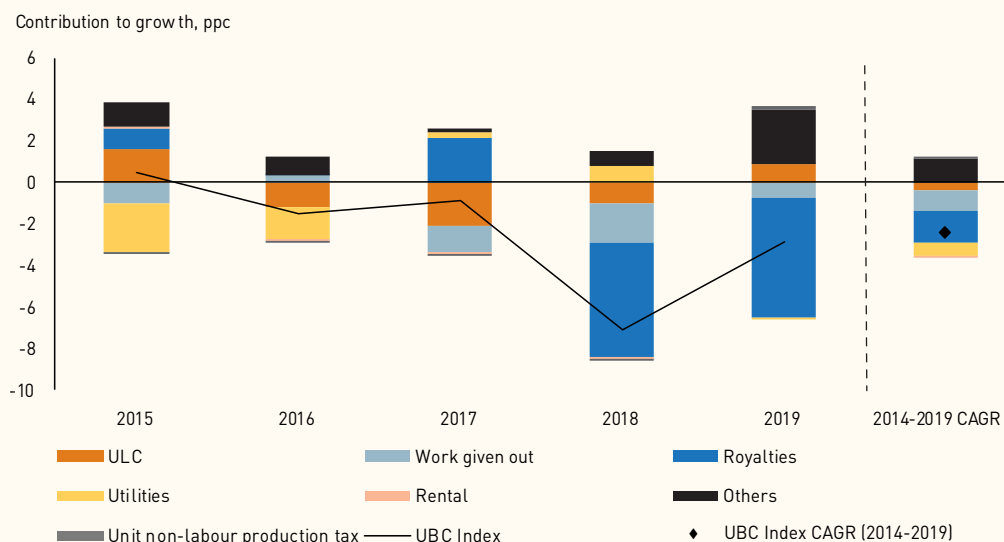
Specifically, a fall in the manufacturing unit labour cost (ULC) in each of the years from 2016 to 2018 contributed to the decline in the UBCI in those years. In 2019, as the manufacturing ULC rose, it exerted upward pressures on the UBCI. (Please see the next section for a description of the ULC trends in the various sectors, including manufacturing, and the drivers of these trends over the last five years.)

For royalty payments, sharp declines in 2018 and 2019 contributed significantly to the fall in the UBCI in those years.<sup>7</sup> By contrast, the “others” component, which includes payments for professional fees and advertising, rose annually and contributed positively to the UBCI across all five years.

Overall, for the five-year period from 2014 to 2019, the 2.4 per cent per annum decline in the manufacturing UBCI can be primarily attributed to a fall in manufacturing ULC, as well as unit services cost components such as royalty payments, work given out and utilities. Collectively, these cost components contributed 3.5 percentage-points (pp) to the decline in the UBCI over this period, more than offsetting the contribution of the “others” component (+1.1pp) to the UBCI. The rest of the cost components like rentals and non-labour production taxes had a relatively small impact on the UBCI given their low share of business costs.

<sup>7</sup> There could be many reasons for changes in royalty payments. For instance, royalty payments vary with company-specific licensing agreements which could differ from year to year. Also, royalties are usually computed as a percentage of sales, which could be volatile each year.

Exhibit 3: Contribution to Manufacturing UBCI Changes by Key Cost Components



Source: Department of Statistics

Note: "Others" consists of sub-components such as professional fees, advertising, commission and agency fees, sundry expenses, etc.

For the overall services sector, the rise in the UBC-Services Index between 2014 and 2019 (i.e., 1.3 per cent per annum) was due to an increase in both the ULC of the sector and other services costs (which include rentals, utilities and freight & transport charges). Specifically, the ULC and other services costs contributed 0.4pp and 0.8pp respectively to the increase in the UBC-Services Index over this period.<sup>8</sup> For the first three quarters of 2019, their contributions to the 5.2 per cent year-on-year increase in the UBC-Services Index were 0.6pp and 4.6pp respectively.

### (III) Recent Trends and Outlook for Key Cost Components

#### Remuneration growth outpaced labour productivity growth, and led to an increase in the overall ULC over the last five years

From 2014 to 2019, the overall ULC for the economy rose by 1.2 per cent per annum. This was because of a 2.9 per cent per annum increase in total labour cost (TLC) per worker, which outpaced the 1.7 per cent per annum increase in labour productivity (Exhibit 4).<sup>9</sup>

In turn, the increase in TLC per worker was primarily due to higher remuneration per worker. Over the last five years, remuneration per worker rose by 3.1 per cent per annum, contributing 2.9pp to the increase in TLC per worker. The remaining labour cost components (e.g., foreign worker levy) contributed little (if any) to the increase in TLC per worker over this period.

<sup>8</sup> Detailed cost component breakdowns for the UBC-Services Index are not available.

<sup>9</sup> An increase in TLC per worker raises the ULC, while an increase in labour productivity reduces the ULC. The TLC comprises remuneration and other labour-related costs, including the skills development levy, foreign worker levy, wage subsidies, and recruitment and net training cost.



At the sectoral level, most sectors experienced ULC increases in recent years (Exhibit 5). The ULC for the overall services sector rose by 1.9 per cent on a CAGR basis from 2014 to 2019, in large part due to remuneration growth outpacing labour productivity growth. Among the services sectors, the increase in ULC tends to be larger for sectors with relatively weaker productivity growth, such as the other services (0.0 per cent per annum) and transportation & storage (-0.3 per cent per annum) sectors. The manufacturing ULC declined by 1.6 per cent on a CAGR basis from 2014 to 2019. This was on account of strong productivity gains in the sector between 2016 and 2018, which outstripped the increase in remuneration per worker over the same period. In 2019, however, the manufacturing ULC rose as the downturn in the sector led to a sharp drop in productivity even as remuneration per worker continued to increase.

Exhibit 4: Decomposition of ULC Growth for Overall Economy, 2014-2019 CAGR

	2014-2019 CAGR (% p.a.)
<b>ULC</b>	<b>1.2</b>
<b>TLC per worker</b>	<b>2.9</b>
Remuneration per worker	2.9pp
FWL per worker	0.0pp
Wage subsidies per worker <sup>1</sup>	0.1pp
Other labour costs	-0.1pp
<b>Gross real labour productivity<sup>2</sup></b>	<b>1.7</b>

Exhibit 5: ULC Growth by Sectors, 2014-2019 CAGR



Source: MTI Staff estimates using data from Department of Statistics and Ministry of Manpower

Notes: (1) Examples of wage subsidies provided to companies include the Special Employment Credit and the Wage Credit Scheme. These subsidies are generally applicable only for Singaporean workers hired by the companies. Wage subsidies per worker contributed positively to the increase in TLC per worker between 2014 and 2019 due to a decline in the wage subsidies provided over this period; (2) Labour productivity is measured as gross value-added per worker in this decomposition as remuneration is on a per worker basis

For 2020, the overall ULC for the economy is likely to continue to rise. This is because even though wage growth is expected to remain stable relative to last year's<sup>10</sup> amidst softer labour market conditions, labour productivity could ease further on account of the weak economic environment.

Over the longer term, it is important to press ahead with efforts to ensure that productivity growth is sustained, so as to maintain wage growth without eroding our cost competitiveness.

### Industrial and commercial rentals are expected to remain subdued

Over the last five years, industrial rentals fell by 3.9 per cent per annum between 2014 and 2017, before stabilising in 2018 and 2019 (Exhibit 6). In 2019, industrial rentals registered a marginal increase of 0.1 per cent as the occupancy rate of industrial space stabilised at a slightly higher level compared to a year ago (Exhibit 7).

10 The nominal median gross monthly income from work of full-time employed residents grew by 2.8% in 2019.

For 2020, around 2.2 million gross square metres of industrial space is expected to be completed (Annex B, Exhibit B1). As a comparison, the average annual supply and demand of industrial space in the past five years were approximately 1.4 million nett square metres and 1.1 million nett square metres respectively. The higher supply quantum in 2020 is to cater to replacement space for lessees affected by JTC's Industrial Replacement Programme (IRP), which is aimed at rejuvenating older industrial estates to support future economic growth. Against this backdrop, industrial rentals should remain subdued in 2020.

Exhibit 6: Industrial Rental Index

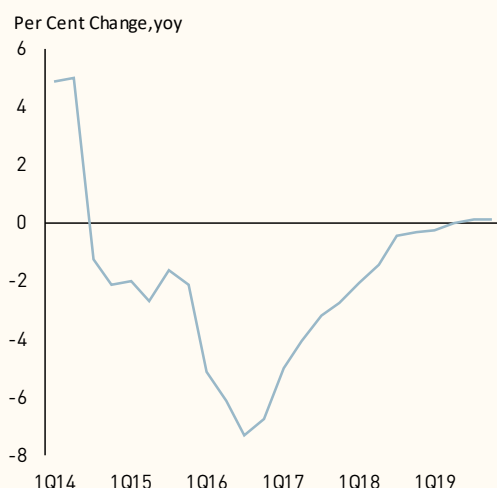
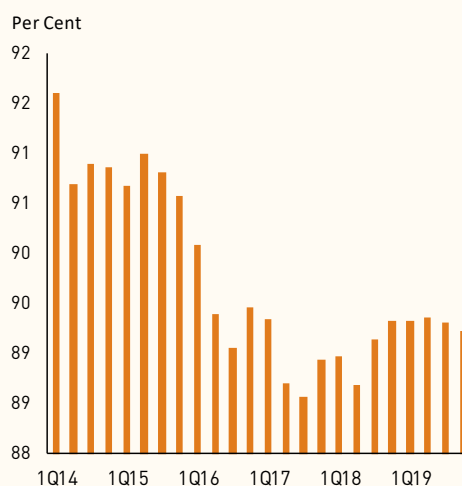


Exhibit 7: Industrial Occupancy Rate



Source : JTC Corporation

Note: Both the industrial rental index and the industrial occupancy rate cover multiple-user factory space, single-user factory space, business parks and warehouses

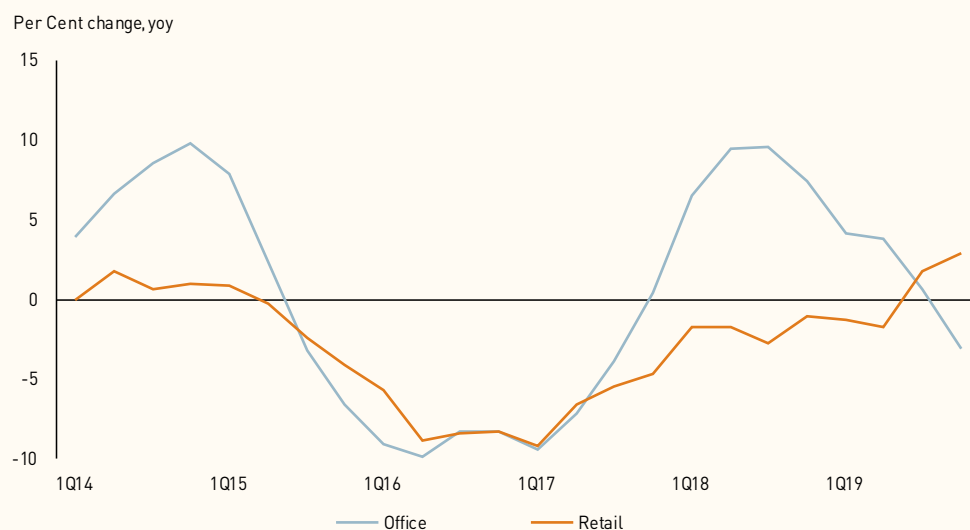
As for commercial space, the rentals of office space declined by 2.2 per cent per annum on a CAGR basis between 2014 and 2019 (Exhibit 8). In recent years, office rentals fell by 3.1 per cent in 2019 due to lower leasing demand amidst uncertainties in the global economy, after rising by 7.4 per cent in 2018.

For 2020, office rental conditions are expected to stay subdued. First, the weak economic outlook and continued uncertainties in the global economy are likely to dampen the demand for office space in the near term. Second, a healthy supply of office space is expected to come on-stream this year, which will exert downward pressure on office rentals. Specifically, 0.23 million gross square metres of office space are projected to come on-stream within the year, similar to the annual average of 0.22 million gross square metres completed between 2014 and 2019 (Annex B, Exhibit B2).

As for retail space, rentals fell by 3.1 per cent per annum between 2014 and 2019 on the back of a sustained decline in rentals between 2015 and the first half of 2019. For 2019 as a whole, retail rentals increased by 2.9 per cent due to improvements in leasing demand.

Looking ahead, the rental outlook for retail space remains cautious as the retail sector continues to face competition from e-commerce, and the outbreak of the coronavirus disease 2019 (COVID-19) is expected to dampen consumer sentiments and spending. Nevertheless, the moderation in retail space supply coming on-stream in 2020 could lend some support to rentals. In particular, 0.07 million gross square metres of retail space are expected to come on-stream within the year, lower than the annual average of 0.22 million gross square metres completed between 2014 and 2019.

Exhibit 8: Office and Retail Rental Indices



Source: Urban Redevelopment Authority

### Costs of utilities, fuel and transportation are likely to remain relatively stable

The cost of utilities borne by firms is closely linked to electricity prices,<sup>11</sup> which are in turn influenced by movements in global oil prices.<sup>12</sup> Oil prices also contribute to business costs through fuel and transportation costs.

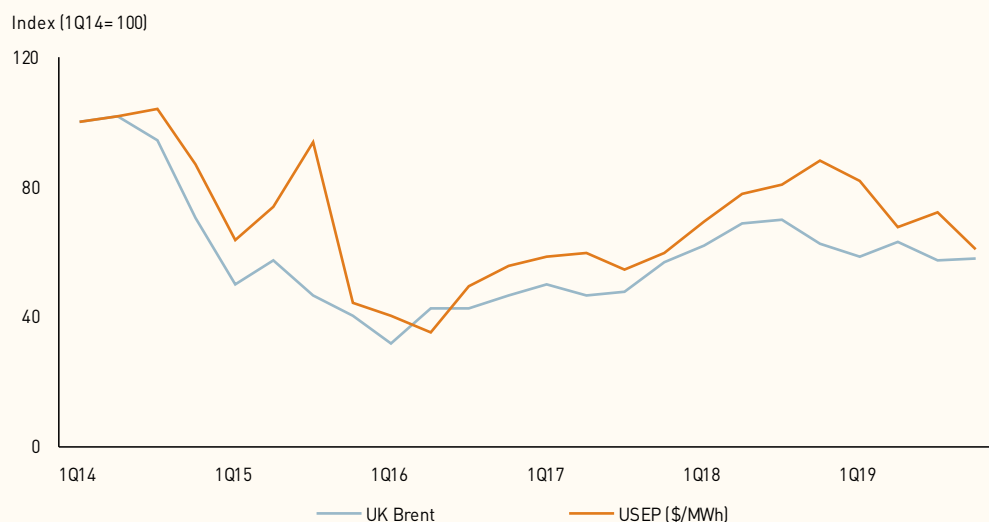
Between 2014 and 2019, the average wholesale electricity price fell by 6.4 per cent per annum, in tandem with a general decline in global oil prices and increased competition in the wholesale and retail electricity markets (Exhibit 9).<sup>13</sup> Looking ahead, the COVID-19 outbreak is expected to lower global oil demand due to a cutback in global economic activity, including in China. However, OPEC+ is likely to cut oil production to mitigate this impact. On balance, the US Energy Information Administration has forecast that global oil prices will average US\$61 per barrel (/bbl) in 2020<sup>14</sup>, slightly lower than the 2019 average of US\$64/bbl. In turn, the drop in oil prices may pose downward pressure on the costs of utilities, fuel and transportation in 2020.

11 For example, electricity cost accounts for around 83% of the cost of utilities borne by firms in the manufacturing sector.

12 About 95% of our electricity is generated from natural gas, the price of which is indexed to oil prices. This is a common market practice in Asia.

13 This refers to the Uniform Singapore Energy Price (USEP), which is the average wholesale energy price in the National Electricity Market of Singapore.

14 EIA Short-Term Energy Outlook Report, 11 February 2020

*Exhibit 9: Global Oil Prices and Uniform Singapore Energy Prices*

Source: International Monetary Fund, CEIC, Energy Market Company

## Conclusion

Over the five-year period of 2014 to 2019, the unit business cost for the manufacturing sector fell, mainly on account of declines in the manufacturing ULC, royalty payments, cost of work given out and utilities cost. In the latest year (i.e., 2019), the unit business cost for the manufacturing sector declined, largely due to a fall in royalty payments, even as manufacturing ULC and the cost of “others” (e.g., advertising and professional fees) increased. Meanwhile, the unit business cost for the overall services sector rose over the same five-year period, including in 2019, on the back of increases in the ULC and other services costs.

Looking ahead, the overall ULC for the economy is likely to continue to increase in 2020. This is because even though wage growth is expected to remain stable amidst softer labour market conditions, labour productivity could ease further on account of the weak economic environment. At the same time, industrial and commercial rental costs are expected to remain subdued, while the costs of utilities, fuel and transportation are likely to be relatively stable.

*Contributed by:*

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## REFERENCES

Singapore Department of Statistics (2014), “Methodological Review on the Unit Business Cost Index for Manufacturing Industry (Base Year 2010=100)” November. <https://www.singstat.gov.sg/-/media/files/publications/economy/ip-e38.pdf>.

U.S. Energy Information Administration (2020), “Short-Term Energy Outlook (STEO)” February. <https://www.eia.gov/outlooks/steo/>.

## ANNEX A: BUSINESS COST STRUCTURE OF MANUFACTURING AND SERVICES SECTORS

### Manufacturing Sector

In the manufacturing sector, labour cost, royalty payments and “others” constitute the largest components of business costs. These three components collectively account for around 77 per cent of the business costs of small- and medium-sized enterprises (SMEs) and around 66 per cent of the business costs of non-SMEs in the sector.

The remaining services cost components, including utilities, fuel, rental of building/premises and charges paid to other firms for inland transportation and ocean/air/other freight, make up a smaller share of business costs, at 33 per cent for non-SMEs and 22 per cent for SMEs. Non-labour production taxes, which include property, road and other indirect taxes, account for only around 0.4 per cent of the business costs of SMEs and non-SMEs in the sector.

Details of the business cost structure of SMEs and non-SMEs in the various manufacturing clusters are in Exhibit A1.

### Services Sector

Labour cost constitutes a major cost component for firms in the services sectors, with its share of business costs ranging from around 10 per cent for firms in the transportation & storage sector, to around 39 per cent or more for firms in labour-intensive sectors such as accommodation, food services and retail. Across all services sectors, except for the wholesale trade, accommodation and transportation & storage sectors, the labour cost share of business costs is larger for SMEs than for non-SMEs.

On the other hand, utilities cost is a relatively small cost component for firms in the services sectors, accounting for less than 2 per cent of the business costs of firms in most sectors. Key exceptions are the firms in the accommodation and food services sectors, where utilities cost constitutes up to 5 per cent of their business costs. Similarly, rental cost accounts for a small share of the business costs of firms in most services sectors. Key exceptions include the retail, accommodation and food services sectors, where the rental cost share of business costs for SMEs is 28 per cent, 15 per cent and 29 per cent respectively.

Like in the manufacturing sector, non-labour production taxes account for less than 1 per cent of the business costs of firms in most services sectors. Even for the accommodation and business services sectors, where the share of non-labour production taxes is the highest, it is relatively small, at less than 4 per cent.

Details of the business cost structure of SMEs and non-SMEs in the various services sectors are in Exhibit A2.

Exhibit A1: Business Cost Structure of the Manufacturing Sector by Firm Size, 2018

	Total		Electronics		Chemicals		Biomedical Services		Precision Engineering		Transport Engineering		General Manufacturing	
	Non-SMEs	SMEs	Non-SMEs	SMEs	Non-SMEs	SMEs	Non-SMEs	SMEs	Non-SMEs	SMEs	Non-SMEs	SMEs	Non-SMEs	SMEs
<b>Labour Cost</b>	20.0	22.6	15.9	2.6	16.1	26.8	21.1	13.1	18.0	42.7	37.4	47.0	37.7	49.6
<b>Services Cost</b>	79.7	77.0	83.9	97.3	83.1	72.1	78.6	86.7	81.7	56.7	62.1	52.4	61.7	49.5
Work given out	19.3	15.4	32.0	16.0	5.3	3.8	2.7	17.5	6.7	15.6	35.9	29.8	6.7	11.6
Royalties payments	22.4	34.1	16.7	58.8	4.8	4.6	44.0	47.2	56.3	21.8	2.2	1.5	5.4	1.6
Utilities	3.4	1.8	3.1	0.2	8.2	9.2	1.2	0.7	1.0	1.9	1.9	1.1	6.1	2.8
Fuel	7.0	0.9	1.0	0.0	37.3	6.6	0.5	0.2	0.1	0.3	0.3	0.3	3.2	1.1
Rental of building/premises	0.7	1.7	0.5	0.2	0.7	1.8	0.7	1.0	0.7	2.5	1.2	2.7	2.6	5.4
Charges paid to other firms														
for inland transportation and ocean/air/other freight	2.7	2.3	1.6	0.3	5.5	11.7	1.5	2.1	2.9	2.1	1.4	1.3	6.2	3.6
Others	24.1	20.8	29.0	21.8	21.2	34.5	28.0	17.9	14.1	12.6	19.3	15.9	31.5	23.3
<b>Non-Labour Production Taxes</b>	0.4	0.4	0.2	0.1	0.8	1.1	0.3	0.2	0.3	0.6	0.5	0.6	0.6	0.9

Note: SMEs refer to enterprises with operating receipts of not more than \$100 million or employment of not more than 200 workers. Non-SMEs refer to enterprises with operating receipts of more than \$100 million and employment of more than 200 workers.

Source: Economic Development Board



Exhibit A2: Business Cost Structure of the Services Sectors by Firm Size, 2018

	Wholesale Trade		Retail Trade		Accommodation		Food Services		Transportation & Storage		Information & Communications		Finance & Insurance		Business Services	
	Non-SMEs	SMEs	Non-SMEs	SMEs	Non-SMEs	SMEs	Non-SMEs	SMEs	Non-SMEs	SMEs	Non-SMEs	SMEs	Non-SMEs	SMEs	Non-SMEs	SMEs
<b>Labour Cost</b>	21.1	20.1	38.0	39.3	51.0	42.7	42.7	48.2	12.3	7.7	13.5	24.8	11.8	13.1	26.7	34.5
<b>Services Cost</b>	78.5	79.3	61.0	60.1	45.5	54.6	56.9	51.5	87.3	92.1	86.2	74.9	88.1	86.6	72.0	62.1
Utilities	0.7	0.2	2.4	1.3	4.4	5.1	4.3	4.6	0.5	0.1	0.4	1.0	0.1	0.1	0.4	1.0
Freight & Transport	11.8	35.0	0.9	2.0	-	-	2.2	0.6	49.6	62.6	-	2.1	-	0.1	0.2	2.0
Financial Services	2.0	2.2	2.4	2.4	1.8	2.3	0.7	1.3	0.5	0.5	0.3	0.2	3.7	4.9	0.1	0.7
Communications	0.6	0.4	0.4	0.8	0.4	0.6	0.2	0.6	0.5	0.2	1.1	5.3	0.2	0.2	0.3	0.5
Renting of Premises	4.3	4.5	34.7	28.4	10.8	14.5	25.2	28.7	0.5	1.8	0.9	3.3	0.8	1.2	1.2	4.3
Professional Services	4.9	3.7	1.3	2.0	1.9	1.6	0.4	1.3	1.0	0.6	11.9	8.3	2.5	3.2	4.1	5.4
Other Services	54.1	33.3	18.9	23.2	26.3	30.5	23.9	14.4	34.7	26.2	71.4	54.6	80.8	76.9	65.7	48.2
Advertising & Entertainment	5.4	6.1	4.6	7.4	4.1	3.3	3.2	2.3	0.5	0.6	14.2	10.7	1.6	0.5	1.5	5.4
Admin & Management Fees	11.1	5.7	3.2	2.6	4.7	7.2	2.9	3.2	3.1	2.8	13.3	10.8	4.3	7.8	13.0	9.1
Contract labour & work given out	11.8	3.3	2.2	2.4	2.4	5.3	2.6	3.0	1.5	2.0	2.2	7.6	0.9	0.3	27.6	13.0
Commission	7.3	6.0	0.6	4.1	2.0	3.7	-	0.4	2.3	1.8	4.4	12.4	3.7	6.5	0.8	3.3
Royalties	11.5	4.2	1.4	0.4	2.6	0.3	8.8	1.3	0.1	-	30.6	4.9	0.6	0.7	2.3	1.3
Maintenance & repairs	1.5	0.9	3.9	2.3	3.1	4.7	3.6	2.3	4.6	1.8	0.9	1.4	0.5	0.3	1.4	3.0
Fuel	-	0.4	0.1	0.1	-	-	0.3	0.1	17.3	12.5	-	-	-	-	-	0.1
Others	5.4	6.6	2.9	3.7	7.3	6.0	2.5	1.7	5.4	4.7	5.9	6.9	69.1	60.8	19.1	13.1
<b>Non-Labour Production Taxes</b>	0.5	0.6	1.0	0.6	3.5	2.8	0.3	0.3	0.4	0.2	0.3	0.3	0.1	0.3	1.3	3.4

Notes:

1. SMEs refer to enterprises with operating receipts of not more than \$100 million or employment of not more than 200 workers. Non-SMEs refer to enterprises with operating receipts of more than \$100 million and employment of more than 200 workers
2. "-" refers to nil or negligible.

Source: Department of Statistics and Monetary Authority of Singapore

## ANNEX B: SUPPLY OF INDUSTRIAL AND COMMERCIAL SPACE

Exhibit B1: Supply of Industrial Space

	Total	2020	2021	2022	2023	2024	>2024
<b>Factory Space ('000 sqm gross)</b>							
<b>Total</b>	<b>4,148</b>	<b>1,868</b>	<b>721</b>	<b>1,242</b>	<b>316</b>	<b>-</b>	<b>-</b>
Under Construction	3,117	1,704	374	815	222	-	-
Planned	1,031	164	346	426	94	-	-
<b>Warehouse Space ('000 sqm gross)</b>							
<b>Total</b>	<b>746</b>	<b>336</b>	<b>35</b>	<b>258</b>	<b>117</b>	<b>-</b>	<b>-</b>
Under Construction	693	313	6	258	117	-	-
Planned	52	23	29	-	-	-	-
<b>Total Industrial Space</b>	<b>4,893</b>	<b>2,205</b>	<b>755</b>	<b>1,500</b>	<b>433</b>	<b>-</b>	<b>-</b>

Source: JTC Corporation

Exhibit B2: Supply of Commercial Space

	Total	2020	2021	2022	2023	2024	>2024
<b>Office Space ('000 sqm gross)</b>							
<b>Total</b>	<b>753</b>	<b>228</b>	<b>139</b>	<b>228</b>	<b>50</b>	<b>29</b>	<b>79</b>
Under Construction	628	228	139	221	40	-	-
Planned	125	-	-	7	10	29	79
<b>Retail Space ('000 sqm gross)</b>							
<b>Total</b>	<b>333</b>	<b>73</b>	<b>73</b>	<b>67</b>	<b>47</b>	<b>9</b>	<b>64</b>
Under Construction	227	73	73	48	33	-	-
Planned	106	-	-	19	14	9	64
<b>Total Commercial Space</b>	<b>1,086</b>	<b>301</b>	<b>212</b>	<b>295</b>	<b>97</b>	<b>38</b>	<b>143</b>

Source: Urban Redevelopment Authority





## CHAPTER 4

# INTERNATIONAL TRADE

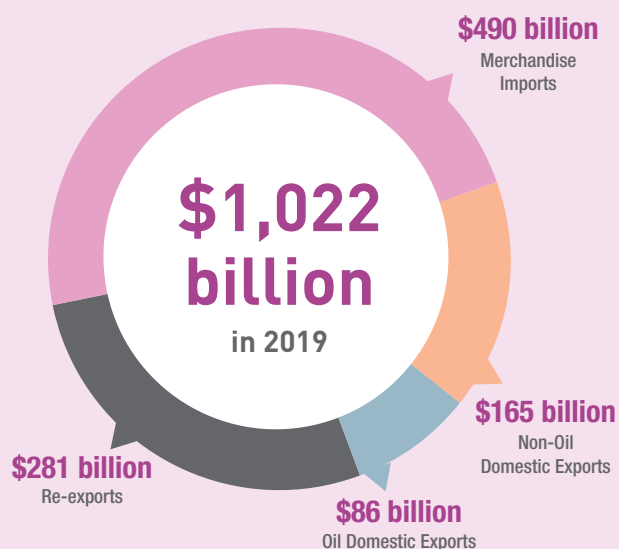




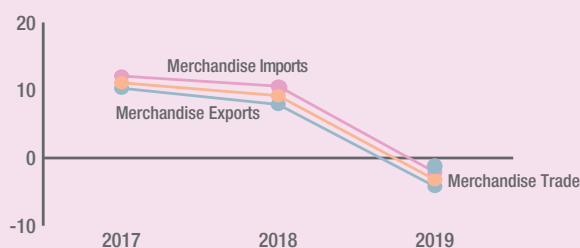
# CHAPTER 4

# INTERNATIONAL TRADE

## TOTAL MERCHANDISE TRADE AMOUNTED TO...



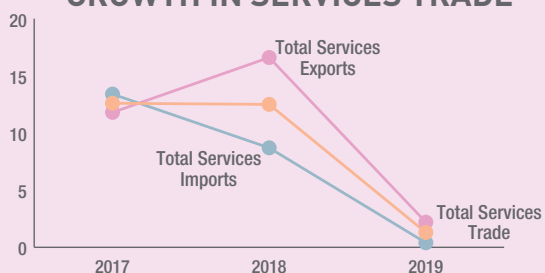
## GROWTH IN MERCHANDISE TRADE



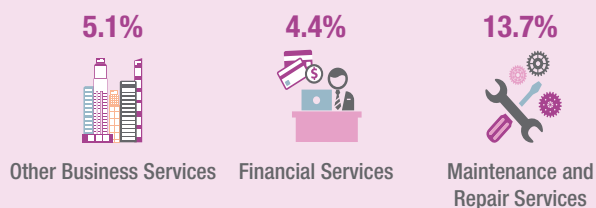
## COMPONENTS OF MERCHANDISE EXPORTS (Year-On-Year Growth)



## GROWTH IN SERVICES TRADE



## MAIN DRIVERS OF SERVICES EXPORT GROWTH WERE...



## TOTAL SERVICES TRADE AMOUNTED TO...





## OVERVIEW

Singapore's total merchandise trade contracted by 5.3 per cent year-on-year in the fourth quarter of 2019, following the 6.7 per cent decline in the preceding quarter. By contrast, total services trade increased by 2.5 per cent year-on-year in the fourth quarter, extending the 0.6 per cent growth in the third quarter.

For the whole of 2019, Singapore's total merchandise trade fell by 3.2 per cent to reach \$1.0 trillion, from the \$1.1 trillion in 2018. Oil trade declined by 13.9 per cent on the back of lower oil prices compared to a year ago, while non-oil trade dipped by 0.3 per cent. Meanwhile, total merchandise exports and imports decreased by 4.2 per cent and 2.1 per cent respectively.

Overall services trade expanded by 1.3 per cent to \$550.9 billion in 2019, from \$543.8 billion in 2018. Services exports grew by 2.2 per cent, while services imports edged up by 0.4 per cent in 2019.

## MERCHANDISE TRADE

### Merchandise Exports

Total merchandise exports fell by 4.3 per cent year-on-year in the fourth quarter, following the 7.3 per cent decline in the preceding quarter (Exhibit 4.1). The fall in total merchandise exports was due to domestic exports, which contracted by 12 per cent in the fourth quarter, easing slightly from the 13 per cent decline in the third quarter. By contrast, re-exports grew by 2.8 per cent, rebounding from the 1.7 per cent drop in the preceding quarter.

*Exhibit 4.1: Growth Rates of Total Merchandise Trade, Merchandise Exports and Merchandise Imports (In Nominal Terms)*

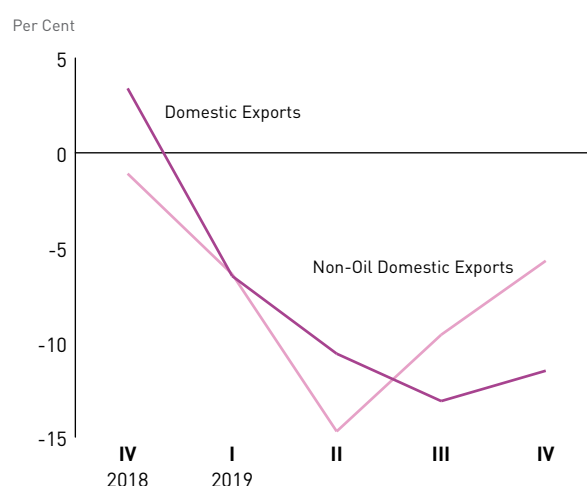
	2018	2019			2019
		II	III	IV	
<b>Total Merchandise Trade</b>	9.2	-2.2	-6.7	-5.3	<b>-3.2</b>
<b>Merchandise Exports</b>	7.9	-4.6	-7.3	-4.3	<b>-4.2</b>
Domestic Exports	8.4	-10.6	-13.1	-11.5	<b>-10.5</b>
Oil	17.1	-2.9	-19.7	-21.5	<b>-12.9</b>
Non-Oil	4.2	-14.7	-9.6	-5.7	<b>-9.2</b>
Re-Exports	7.4	2.0	-1.7	2.8	<b>2.3</b>
<b>Merchandise Imports</b>	10.6	0.5	-5.9	-6.3	<b>-2.1</b>
Oil	18.9	-9.6	-18.2	-20.4	<b>-13.5</b>
Non-oil	8.3	3.7	-2.3	-1.9	<b>1.5</b>

For the whole of 2019, total merchandise exports declined by 4.2 per cent, reversing the 7.9 per cent increase in 2018.

### Non-Oil Domestic Exports

Non-oil domestic exports (NODX) fell by 5.7 per cent year-on-year in the fourth quarter, moderating from the 9.6 per cent decline in the preceding quarter (Exhibit 4.2). The fall in NODX was due to a drop in both electronics and non-electronics NODX.

*Exhibit 4.2: Changes in Domestic Exports*



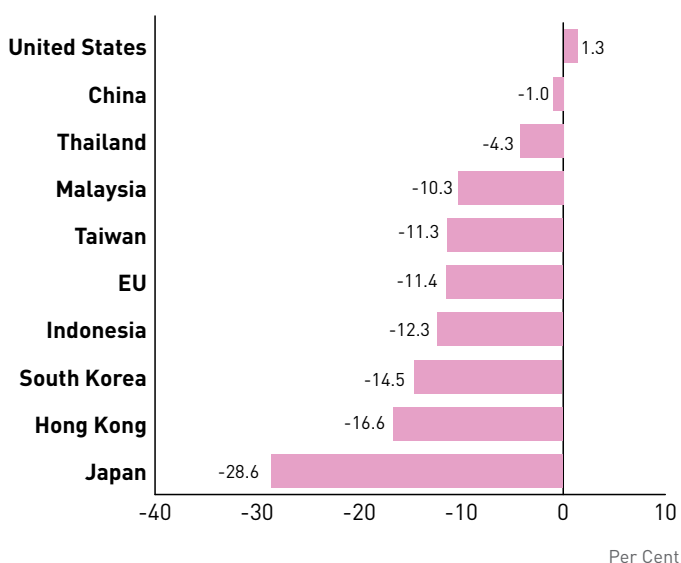
Electronics NODX contracted by 20 per cent in the fourth quarter, following the 25 per cent decline in the previous quarter. The fall in electronics NODX was primarily due to a drop in the domestic exports of ICs, PCs and disk drives. Non-electronics NODX decreased slightly by 0.3 per cent in the fourth quarter, easing from the 3.9 per cent decline in the preceding quarter. The contraction in non-electronics NODX was on account of a decline in the domestic exports of pharmaceuticals, petrochemicals and primary chemicals.

For the full year, NODX declined by 9.2 per cent, a sharp reversal from the 4.2 per cent increase in 2018. The decline was due to lower shipments of both electronics (-23 per cent) and non-electronics (-4.5 per cent) products.

The top 10 NODX markets accounted for 81 per cent of Singapore's total NODX in 2019. Singapore's NODX to all the top 10 markets declined in 2019, except for the NODX to the United States (Exhibit 4.3). The biggest contributors to the NODX decline were Japan (-29 per cent), the EU 28 (-11 per cent) and Hong Kong (-17 per cent).

NODX to Japan fell mainly because of a drop in the exports of specialised machinery, pharmaceuticals and ICs. NODX to the EU 28 decreased as a result of a decline in the exports of pharmaceuticals, civil engineering equipment parts and PCs. Meanwhile, disk media products, PCs and ICs contributed the most to the decline in NODX to Hong Kong. On the other hand, NODX to the United States rose due to an increase in the exports of miscellaneous manufactured articles, medical apparatus and specialised machinery.

Exhibit 4.3: Growth Rates of Non-Oil Domestic Exports to Top Ten Markets in 2019



## Oil Domestic Exports

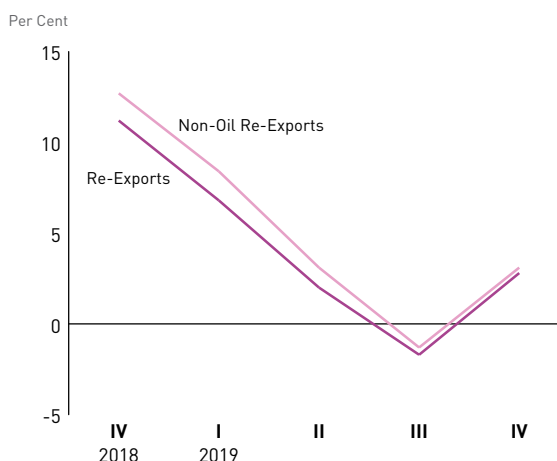
Oil domestic exports contracted by 22 per cent year-on-year in the fourth quarter, following the 20 per cent decline in the preceding quarter. The contraction in oil domestic exports was led by a drop in exports to Hong Kong, Indonesia and Panama, partly reflecting lower oil prices in the fourth quarter as compared to a year ago. In volume terms, oil domestic exports declined by 6.6 per cent in the fourth quarter, extending the 9.2 per cent decrease in the third quarter.

For the full year, oil domestic exports fell by 13 per cent, a reversal from the 17 per cent growth in 2018, on account of lower oil prices. The decline in oil domestic exports was driven mainly by lower exports to Indonesia, Malaysia and Panama. In volume terms, oil domestic exports dropped by 5.6 per cent in 2019, worsening from the 4.7 per cent contraction in 2018.

## Non-Oil Re-Exports

Non-oil re-exports (NORX) expanded by 3.1 per cent year-on-year in the fourth quarter, reversing the 1.3 per cent decline in the preceding quarter (Exhibit 4.4). The growth in NORX was on account of an increase in both electronics and non-electronics NORX. Electronics NORX grew by 0.5 per cent, a turnaround from the 1.9 per cent decline in the third quarter, due to an increase in the re-exports of telecommunications equipment, consumer electronics and diodes & transistors. Meanwhile, non-electronics NORX expanded by 5.5 per cent, a reversal from the 0.8 per cent drop in the preceding quarter. The increase in non-electronics NORX was mainly due to a rise in the re-exports of aircraft parts, personal beauty products and specialised machinery.

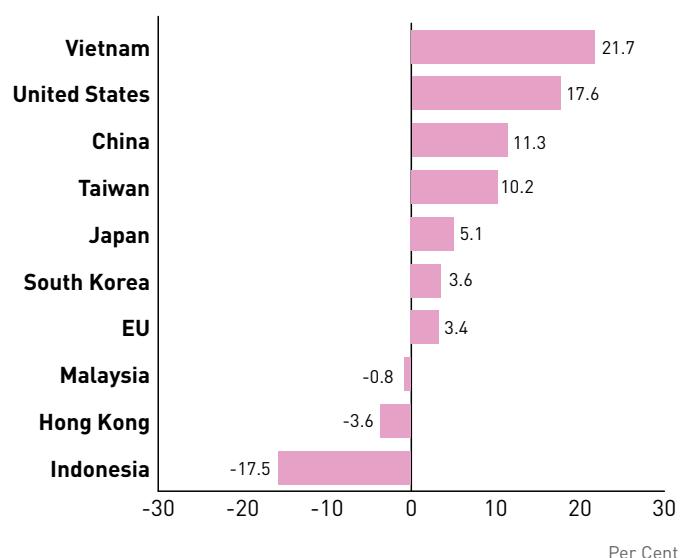
Exhibit 4.4: Changes in Re-Exports



For the whole of 2019, NORX grew by 3.1 per cent, extending the 8.1 per cent growth in 2018. Growth could be attributed to an increase in both electronics (1.1 per cent) and non-electronics (5.0 per cent) NORX.

NORX to the top 10 NORX markets rose in 2019, except for Indonesia, Hong Kong and Malaysia (Exhibit 4.5). NORX to China expanded on the back of a rise in re-exports of ICs, telecommunications equipment and personal beauty products. NORX to the US edged up due to higher shipments of piston engines, parts of PCs and non-electric engines & motors. Meanwhile, NORX to Vietnam rose as the shipments of ICs, telecommunications equipment and non-electric engines & motors increased. On the other hand, NORX to Indonesia declined because of a fall in the shipments of telecommunications equipment, non-monetary gold and electrical circuit apparatus.

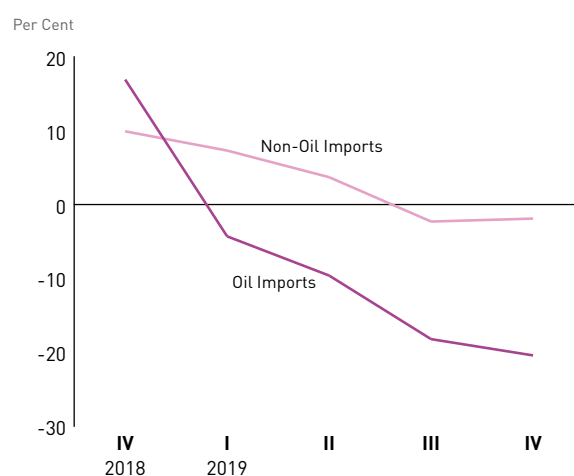
*Exhibit 4.5: Growth Rates of Non-Oil Re-Exports to Top Ten Markets in 2019*



## Merchandise Imports

Non-oil imports decreased by 1.9 per cent year-on-year in the fourth quarter, following the 2.3 per cent decline in the preceding quarter (Exhibit 4.6). The drop in non-oil imports came on the back of a fall in both electronics (-0.7 per cent) and non-electronics (-2.5 per cent) imports. Lower imports of ICs, parts of PCs and capacitors contributed to the decline in electronics imports. Meanwhile, non-electronics imports fell because the imports of non-monetary gold, aircraft parts and other specialty chemicals declined.

*Exhibit 4.6: Changes in Merchandise Imports*



Oil imports contracted by 20 per cent year-on-year in the fourth quarter, extending the 18 per cent decrease in the preceding quarter. In volume terms, oil imports declined by 6.9 per cent, following the 4.4 per cent drop in the preceding quarter.

For the full year, non-oil imports saw an expansion of 1.5 per cent, slower than the 8.3 per cent increase in 2018. Oil imports declined by 14 per cent, a reversal from the 19 per cent growth in 2018.

## SERVICES TRADE

### Services Exports

Services exports rose by 4.5 per cent year-on-year in the fourth quarter, faster than the 1.9 per cent increase in the third quarter. Growth was primarily driven by the exports of other business services, financial services, and maintenance & repair services, which rose by 5.8 per cent, 9.1 per cent and 24 per cent respectively. By contrast, the exports of transport services contracted by 2.1 per cent.

For the full year, services exports increased by 2.2 per cent, down from the 17 per cent expansion in 2018. Total services exports rose on the back of an increase in the exports of other business services (5.1 per cent), financial services (4.4 per cent), and maintenance & repair services (14 per cent) in 2019. These increases were partially offset by a decline in the exports of transport services (-2.1 per cent).

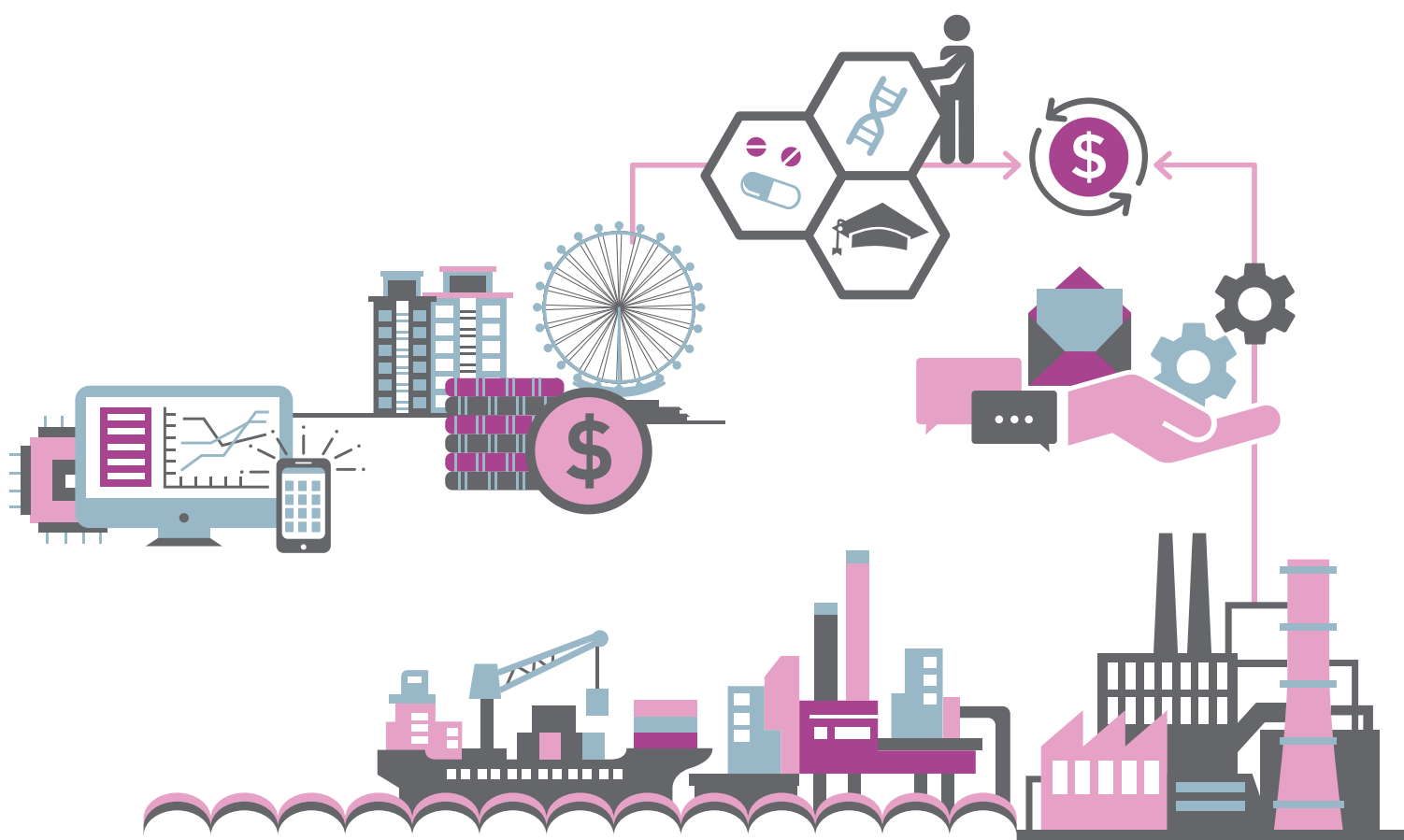
### Services Imports

Services imports expanded by 0.6 per cent year-on-year in the fourth quarter, a reversal from the 0.8 per cent decline in the third quarter. The growth in services imports was mainly supported by the imports of financial services, travel services and insurance services, which rose by 18 per cent, 3.0 per cent and 18 per cent respectively. Conversely, the imports of transport services decreased by 2.3 per cent.

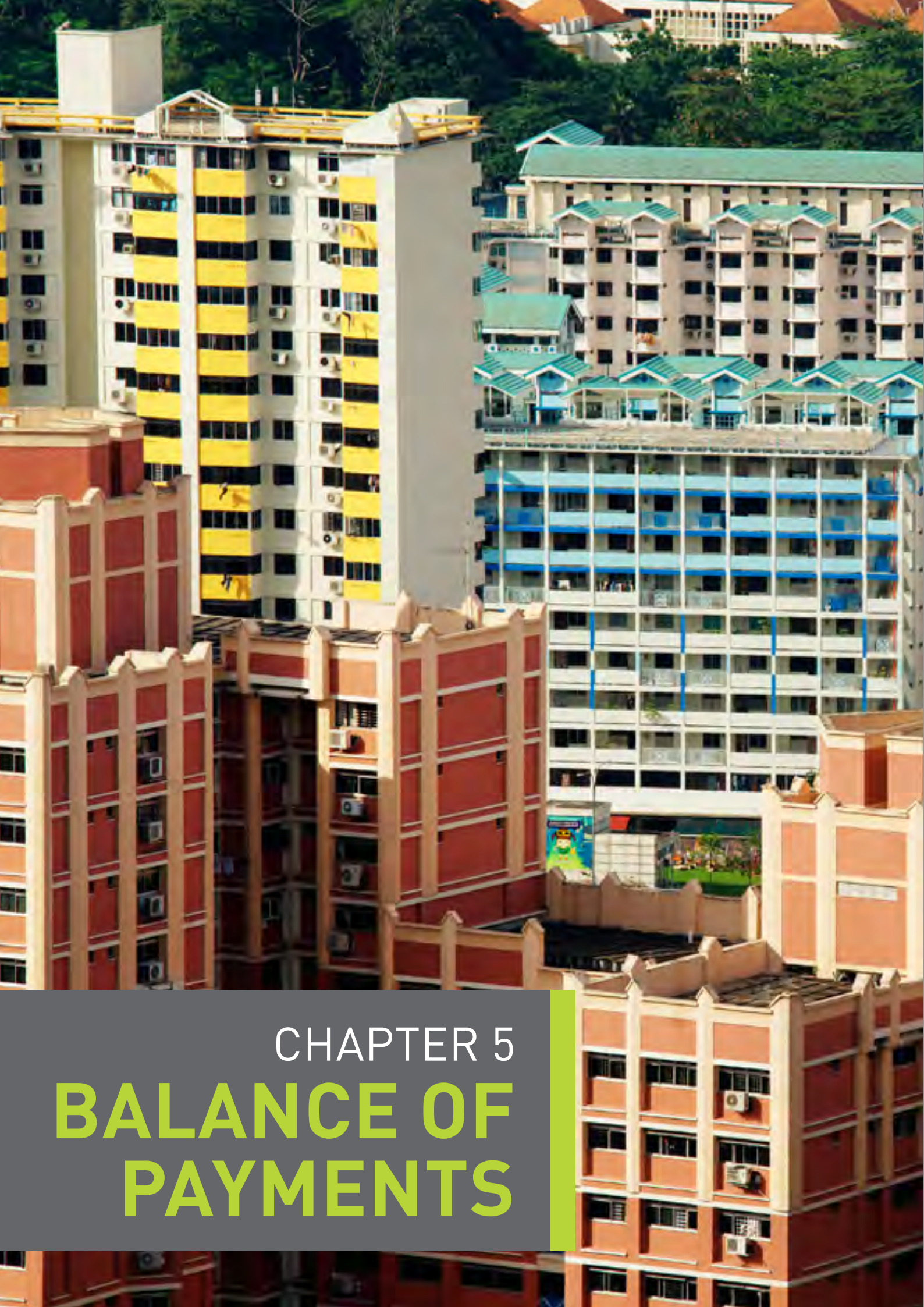
For the whole of 2019, services imports edged up by 0.4 per cent, a slower pace compared to the 8.7 per cent increase in 2018. Overall services imports grew due to a pick up in the imports of financial services (19 per cent) and travel services (2.5 per cent) for the year. These increases were partially offset by a decline in the imports of transport services (-1.1 per cent) and payments for the use of intellectual property (-2.8 per cent).

*Exhibit 4.7: Growth Rates of Total Services Trade, Services Exports and Services Imports (In Nominal Terms)*

	2018	2019			2019
		II	III	IV	
<b>Total Services Trade</b>	12.5	1.9	0.6	2.5	<b>1.3</b>
Services Exports	16.6	1.9	1.9	4.5	<b>2.2</b>
Services Imports	8.7	1.9	-0.8	0.6	<b>0.4</b>







# CHAPTER 5

# BALANCE OF PAYMENTS

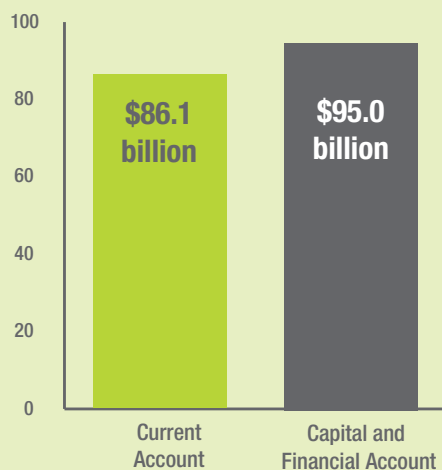




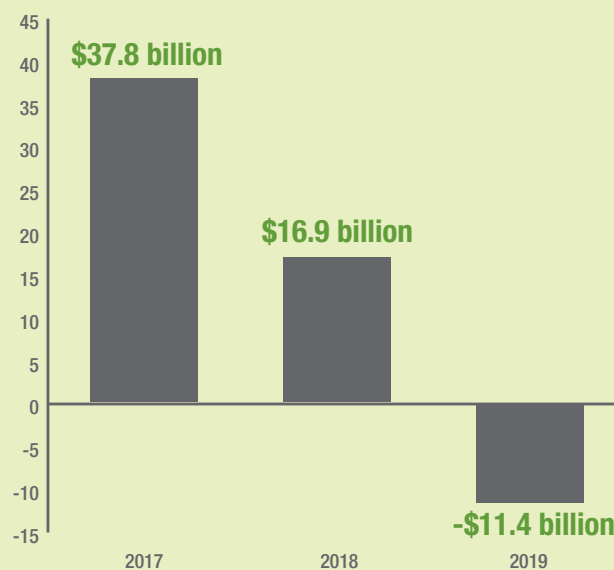
## CHAPTER 5

# BALANCE OF PAYMENTS

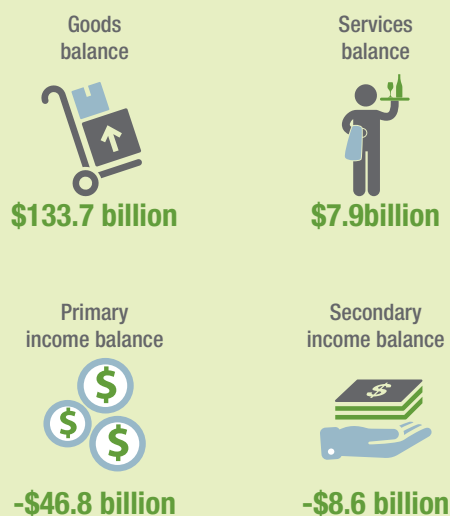
Singapore's balance of payments deficit came in at  
**\$11.4 billion**  
at the end of 2019



### BALANCE OF PAYMENTS TREND



### COMPONENTS OF CURRENT ACCOUNT



### COMPONENTS OF CAPITAL & FINANCIAL ACCOUNT



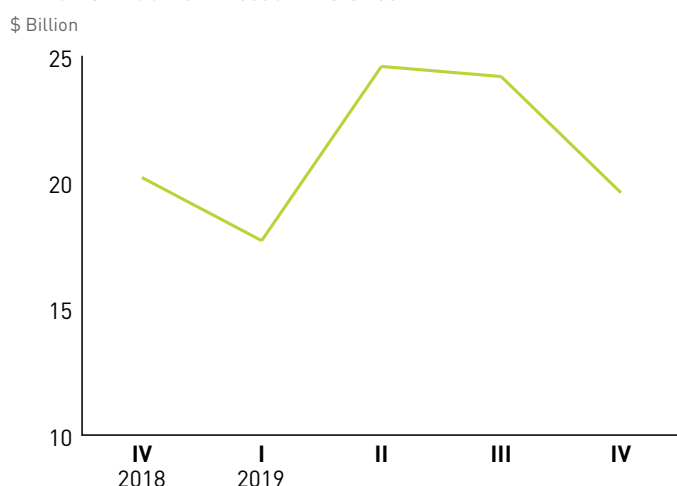
## OVERVIEW

Singapore's overall balance of payments narrowed to \$3.5 billion in the fourth quarter of 2019, from \$4.1 billion in the third quarter. For 2019 as a whole, the overall balance of payments registered a deficit of \$11 billion, reversing the surplus of \$17 billion in 2018. This was mainly due to larger net outflows from the capital and financial account. Singapore's official foreign reserves fell to \$376 billion at the end of 2019, equivalent to nine months of merchandise imports.

## CURRENT ACCOUNT

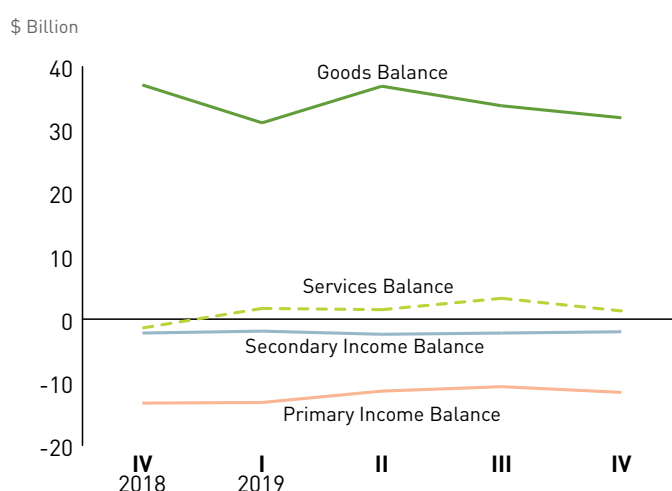
The current account surplus narrowed to \$20 billion in the fourth quarter, from \$24 billion in the third quarter (Exhibit 5.1). For 2019 as a whole, the surplus came in at \$86 billion (17 per cent of GDP), comparable to 2018's level. Despite a larger surplus in the services balance and a smaller deficit in the primary income balance, the full-year current account surplus remained broadly unchanged from that in 2018 as these changes were offset by a smaller surplus in the goods balance and a larger deficit in the secondary income balance.

Exhibit 5.1: Current Account Balance



In terms of the sub-components of the current account, the surplus in the goods balance dropped by \$1.9 billion from the preceding quarter to \$32 billion in the fourth quarter, as goods imports rose by more than exports (Exhibit 5.2). For the full year, the goods balance registered a smaller surplus of \$134 billion, compared to the \$140 billion in 2018, as the fall in goods exports outpaced the decline in goods imports.

Exhibit 5.2: Components of Current Account Balance



The surplus in the services balance narrowed to \$1.3 billion in the fourth quarter, from \$3.3 billion in the preceding quarter. However, for the full year, the surplus in the services balance widened to \$7.9 billion, from \$2.8 billion in 2018. Although net payments for travel and transport services rose, they were more than offset by lower net payments for other business services and charges for the use of intellectual property, as well as higher net receipts for maintenance & repair services.

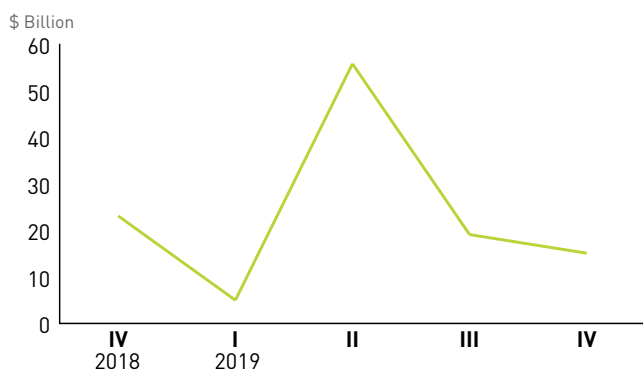
For the primary income balance, the deficit widened by \$0.9 billion from the previous quarter to \$12 billion in the fourth quarter. However, for the year as a whole, the deficit narrowed to \$47 billion, from \$48 billion in 2018, as primary income receipts rose faster than payments.



## CAPITAL AND FINANCIAL ACCOUNT

Net outflows from the capital and financial account<sup>1</sup> fell to \$15 billion in the fourth quarter, from \$19 billion in the previous quarter (Exhibit 5.3). For the year as a whole, net outflows rose to \$95 billion (19 per cent of GDP), from \$66 billion in 2018. The rise in net outflows was due to higher net outflows of portfolio investment, which outweighed an increase in the net inflows of direct investment and a decline in the net outflows of financial derivatives and “other investment”.

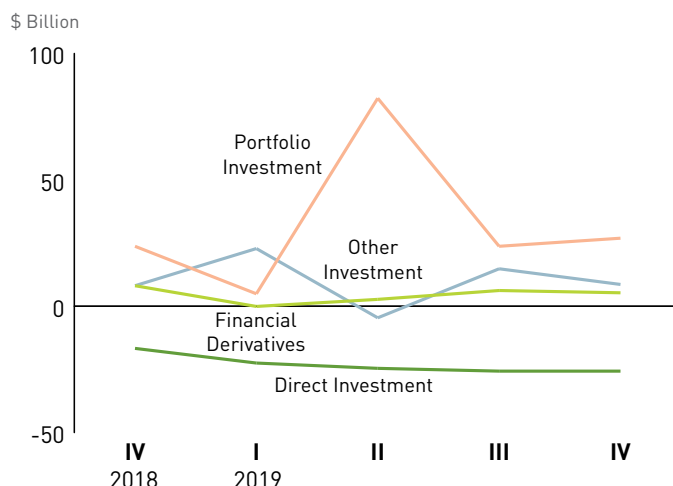
Exhibit 5.3: Capital and Financial Account Balance



In terms of the sub-components of the capital and financial account, net outflows of portfolio investment rose by \$3.2 billion in the fourth quarter to \$27 billion (Exhibit 5.4). For the full year, net outflows of portfolio investment amounted to \$138 billion, significantly larger than the \$48 billion in 2018. This was mainly due to resident deposit-taking corporations reversing from net sales to net purchases of overseas securities for the year.

Direct investment recorded net inflows amounting to \$26 billion in the fourth quarter, comparable to the previous quarter. For 2019 as a whole, net inflows of direct investment amounted to \$98 billion, higher than the \$83 billion registered in 2018. This occurred as the increase in foreign direct investment into Singapore exceeded that of residents' direct investment abroad.

Exhibit 5.4: Components of Financial Account (Net)



Net outflows from the “other investment” account fell to \$8.6 billion in the fourth quarter, from \$15 billion in the preceding quarter. For the full year, net outflows amounted to \$42 billion, lower than the \$75 billion recorded in 2018. This was due to a shift by the non-bank private sector from a net outflow to a net inflow position, as well as smaller net outflows from deposit-taking corporations.

Financial derivatives recorded lower net outflows of \$5.3 billion in the fourth quarter, as compared to \$6.2 billion in the third quarter. Likewise, for the full year, net outflows of financial derivatives fell to \$14 billion, from the \$26 billion in 2018.

<sup>1</sup> Net inflows in net balances are indicated by a minus (-) sign. For more details regarding the change in sign convention to the financial account, please refer to DOS's information paper on “Singapore's International Accounts: Methodological Updates and Recent Developments”.







# CHAPTER 6

# SECTORAL PERFORMANCE





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# CHAPTER 6

## SECTORAL PERFORMANCE







### OVERALL ECONOMY



STRUCTURE OF ECONOMY	Nominal Value Added Share (%)	Real Growth (%)
<b>TOTAL</b>	<b>100.0</b>	<b>0.7</b>
<b>Goods Producing Industries</b>	<b>25.8</b>	<b>-0.8</b>
Manufacturing	20.9	-1.4
Construction	3.7	2.8
Utilities	1.2	0.6
Other Goods Industries	0.0	5.1
<b>Services Producing Industries</b>	<b>70.3</b>	<b>1.1</b>
Wholesale & Retail Trade	17.3	-2.9
Transportation & Storage	6.7	0.8
Accommodation & Food Services	2.1	1.9
Information & Communications	4.3	4.3
Finance & Insurance	13.9	4.1
Business Services	14.8	1.4
Other Services Industries	11.3	2.6
<b>Ownership of Dwellings</b>	<b>3.8</b>	<b>4.3</b>

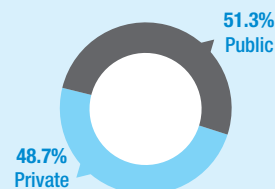
### MANUFACTURING

#### CLUSTERS IN THE MANUFACTURING SECTOR

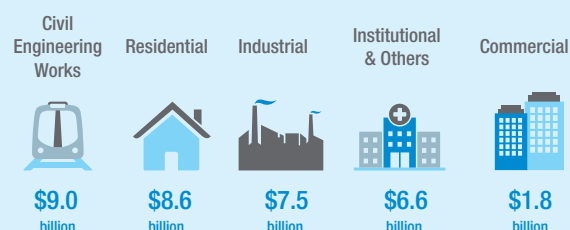
	Nominal VA Share (%)	Real Growth (%)
 Electronics	39.3	-7.4
 Chemicals	10.8	-2.0
 Biomedical Manufacturing	20.1	10.7
 Precision Engineering	12.4	-2.5
 Transport Engineering	9.2	-1.8
 General Manufacturing Industries	8.2	1.5

### CONSTRUCTION

#### CERTIFIED PAYMENTS IN 2019





#### CONTRACTS AWARDED IN 2019





## WHOLESALE &amp; RETAIL TRADE




## WHOLESALE TRADE

Nominal VA Share (%)	Real Growth (%)
90.8	-2.9
Foreign Wholesale Trade Index growth	Domestic Wholesale Trade Index growth
	
-2.7%	-6.2%

## RETAIL TRADE

Nominal VA Share (%)	Real Growth (%)
9.2	-2.8
Retail Sales Index growth (Non-motor Vehicles)	Retail Sales Index growth (Motor Vehicles)
	
-1.6%	-11.1%

## INFORMATION &amp; COMMUNICATIONS

	Nominal VA Share (%)	Real Growth (%)
 Telecommunications	25.8	2.6
 IT & Information Services	59.5	6.9
 Others	14.7	-2.2

## FINANCE &amp; INSURANCE

FINANCE & INSURANCE	Nominal Value Added Share (%)	Real Growth (%)
Banking	44.9	2.5
Activities Auxiliary To Financial Services	18.4	12.6
Fund Management	10.1	0.4
Insurance	17.2	2.6
Others	9.4	2.7

## TRANSPORTATION &amp; STORAGE

TRANSPORTATION & STORAGE	Nominal Value Added Share (%)	Real Growth (%)
Land Transport*	18.9	0.1
Water Transport*	38.8	0.8
Air Transport*	23.4	3.7
Storage & Other Support Services	15.8	-2.5
Postal & Courier	3.1	4.2

\*Including supporting services



4.2% Air passengers handled growth



-0.6% Total sea cargo handled growth



1.7% Motor-vehicle population growth

## GROWTH OF BANK LOANS &amp; ADVANCES TO NON-BANK CUSTOMERS IN 2019

Total Loans



3.1%

Loans to Businesses



5.9%

Consumer Loans



-1.3%

## BUSINESS SERVICES

BUSINESS SERVICES	Nominal Value Added Share (%)	Real Growth (%)
Real Estate	22.6	0.3
Rental & Leasing	23.7	-1.7
Legal	3.4	0.7
Accounting	2.5	1.2
Head Offices & Business Representative Offices	12.7	5.6
Business & Management Consultancy	3.9	0.7
Architectural & Engineering	10.2	4.7
Other Professional, Scientific & Technical Services	7.0	1.5
Other Administrative & Support Services	13.9	3.4

## ACCOMMODATION & FOOD SERVICES

### ACCOMMODATION

Nominal VA Share (%)	Real Growth (%)
43.1	3.1





#### PERFORMANCE OF HOTELS

Gross lettings growth		3.9%
Room revenue growth		2.7%

### FOOD SERVICES

Nominal VA Share (%)	Real Growth (%)
56.9	1.0

#### PERFORMANCE OF F&B (SALES GROWTH)

Fast Food		6.2%
Others		1.4%
Restaurants		1.5%
Food Caterers		-3.2%

## OTHER SERVICES INDUSTRIES

OTHER SERVICES INDUSTRIES	Nominal Value Added Share (%)	Real Growth (%)
Public Administration & Defence	23.9	0.6
Education, Health & Social Work	52.3	3.2
Arts, Entertainment & Recreation	11.5	4.2
Others	12.2	2.1





# 6.1

## MANUFACTURING

### OVERVIEW

The manufacturing sector contracted by 2.3 per cent year-on-year in the fourth quarter of 2019, extending the 0.7 per cent contraction in the preceding quarter. The sector's performance was dragged down mainly by a decline in the output of the electronics cluster.

For the whole of 2019, the manufacturing sector shrank by 1.4 per cent, a reversal from the 7.0 per cent expansion in the previous year. The sector contracted on the back of output declines in the electronics, precision engineering, transport engineering and chemicals clusters.

### OVERALL MANUFACTURING PERFORMANCE

In the fourth quarter, manufacturing output fell by 2.3 per cent, due to output contractions in the electronics, transport engineering, chemicals and general manufacturing clusters. On the other hand, output in the biomedical manufacturing and precision engineering clusters increased during the quarter [Exhibit 6.1].

For the whole of 2019, the manufacturing sector contracted by 1.4 per cent, a sharp reversal from the 7.0 per cent growth achieved in 2018. The contraction in the sector was due to output declines in the electronics, precision engineering, transport engineering and chemicals clusters [Exhibit 6.2].

Exhibit 6.1: Manufacturing Growth Rates

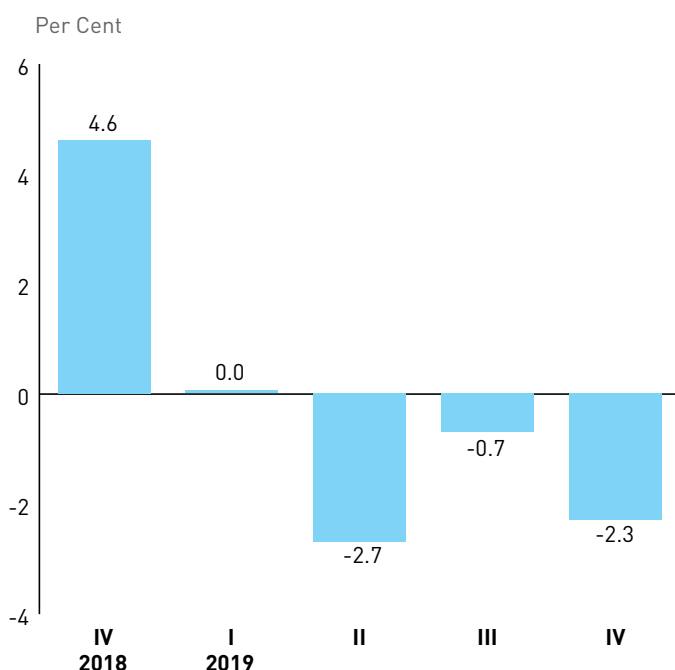
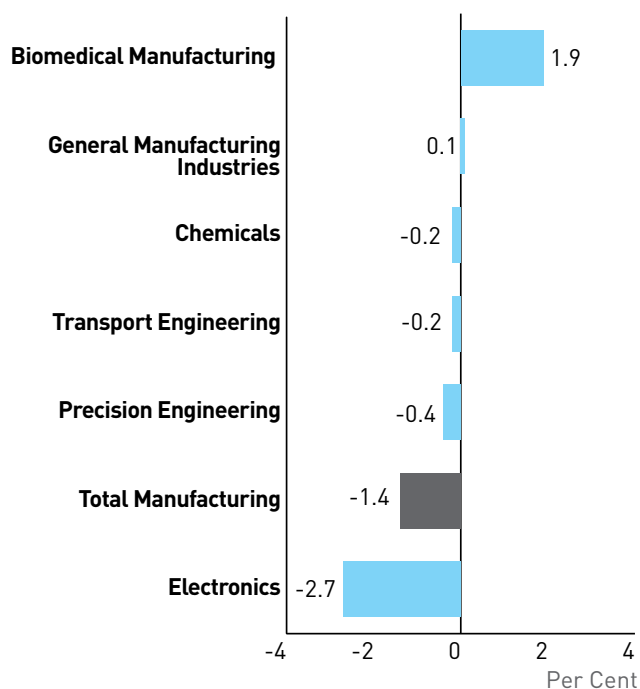


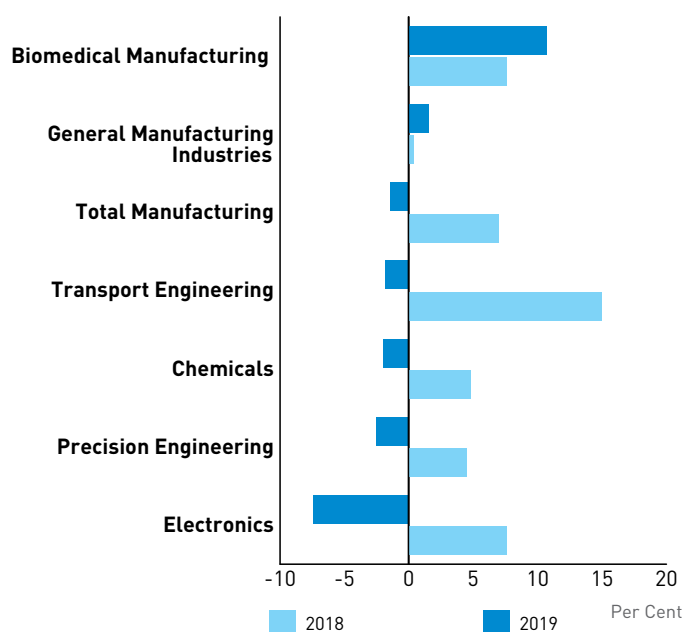
Exhibit 6.2: Percentage-Point Contribution to Manufacturing Sector's Growth in 2019



### PERFORMANCE OF CLUSTERS

Output of the biomedical manufacturing cluster increased by 8.1 per cent in the fourth quarter, supported by growth in both the pharmaceuticals and medical technology segments. The pharmaceuticals segment expanded by 7.1 per cent because of a higher level of production of active pharmaceutical ingredients (APIs) and biological products. The medical technology segment grew by 10 per cent on the back of higher export demand for medical devices. For the full year, output of the biomedical manufacturing cluster rose by 11 per cent, supported by strong output expansions in both segments.

Exhibit 6.3: Manufacturing Clusters' Growth



Output of the general manufacturing cluster fell by 2.0 per cent in the fourth quarter. The performance of the cluster was weighed down by the food, beverages & tobacco and printing segments, which contracted by 5.2 per cent and 9.3 per cent respectively. The former was due to a fall in the production of milk powder products. By contrast, the miscellaneous industries segment expanded by 4.2 per cent on account of an increase in the production of wearing apparel and construction-related products. For the whole of 2019, the general manufacturing cluster grew by 1.5 per cent.

The electronics cluster contracted by 7.8 per cent in the fourth quarter, on the back of output declines in the semiconductors (-8.8 per cent), computer peripherals (-20 per cent) and infocomms & consumer electronics (-6.2 per cent) segments. By contrast, output in the data storage and other electronics modules & components segments rose by 23 per cent and 0.6 per cent respectively. For 2019 as a whole, the electronics cluster shrank by 7.4 per cent on account of weak global semiconductor demand and uncertainties related to the US-China trade conflict throughout the year.

The precision engineering cluster expanded by 6.3 per cent in the fourth quarter, supported by output expansions in both the precision modules & components (PMC) and machinery & systems (M&S) segments. In particular, the PMC segment expanded by 12 per cent on the back of robust growth in the output of optical instruments and metal precision components. Similarly, the M&S segment grew by 2.4 per cent due to an increase in the production of semiconductor equipment. For the whole of 2019, the precision engineering cluster shrank by 2.5 per cent.

The transport engineering cluster contracted by 6.3 per cent in the fourth quarter, dragged down by a 25 per cent decline in the output of the marine & offshore engineering (M&OE) segment. The latter was due to a step-down in the level of offshore and shipbuilding activities. On the other hand, the aerospace and land transport segments expanded by 12 per cent and 7.2 per cent respectively. In particular, the aerospace segment was supported by an increase in the volume of repair and maintenance jobs from commercial airlines. For the whole of 2019, the transport engineering cluster contracted by 1.8 per cent, as output declines in the M&OE segment outweighed output expansions in the aerospace and land transport segments.

The chemicals cluster shrank by 8.2 per cent in the fourth quarter, with all segments recording lower levels of output. The poor performance of the cluster was primarily driven by the petrochemicals and specialty chemicals segments, which contracted by 13 per cent and 7.0 per cent respectively due to scheduled plant maintenance shutdowns. For 2019 as a whole, the output of the chemicals cluster fell by 2.0 per cent, with declines in all segments, except for the other chemicals segment.

## 6.2 CONSTRUCTION

### OVERVIEW

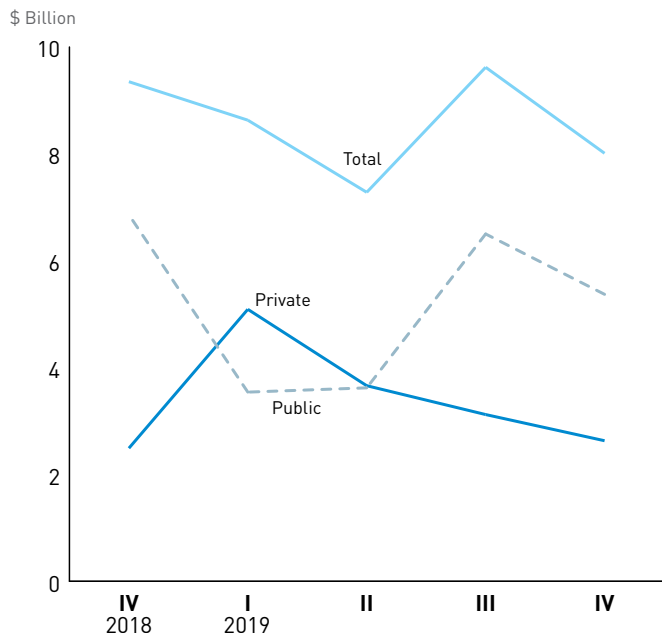
The construction sector expanded by 4.3 per cent year-on-year in the fourth quarter of 2019, extending the 3.1 per cent growth recorded in the previous quarter.

For the whole of 2019, the sector grew by 2.8 per cent, rebounding from the 3.5 per cent contraction in the preceding year.

### CONSTRUCTION DEMAND

Construction demand (or contracts awarded) decreased by 14 per cent year-on-year to \$8.0 billion in the fourth quarter. This was due to lower public sector construction demand given the high base in the same quarter in 2018 (Exhibit 6.4).

Exhibit 6.4: Contracts Awarded



For the full year, total construction demand increased by 9.8 per cent to \$33.5 billion (Exhibit 6.5) on the back of expansions in both public and private sector construction demand.

Exhibit 6.5: Contracts Awarded, 2019 (\$ Billion)

	Total	Public	Private
<b>Total</b>	33.5	19.0	14.5
Residential	8.6	3.6	5.0
Commercial	1.8	0.1	1.8
Industrial	7.5	2.7	4.8
Institutional & Others	6.6	5.0	1.6
Civil Engineering Works	9.0	7.7	1.3

### Public Sector

In the fourth quarter, public sector construction demand declined by 22 per cent to \$5.4 billion. This was primarily due to weaker demand for public industrial building works and public civil engineering works.

For the full year, public sector construction demand increased by 4.0 per cent to \$19 billion. The increase was mainly due to a rise in the demand for industrial building works (242 per cent) and institutional & others building works (14 per cent). Some of the major projects awarded include JTC's business park development and SIT's campus construction at the Punggol Digital District.

## Private Sector

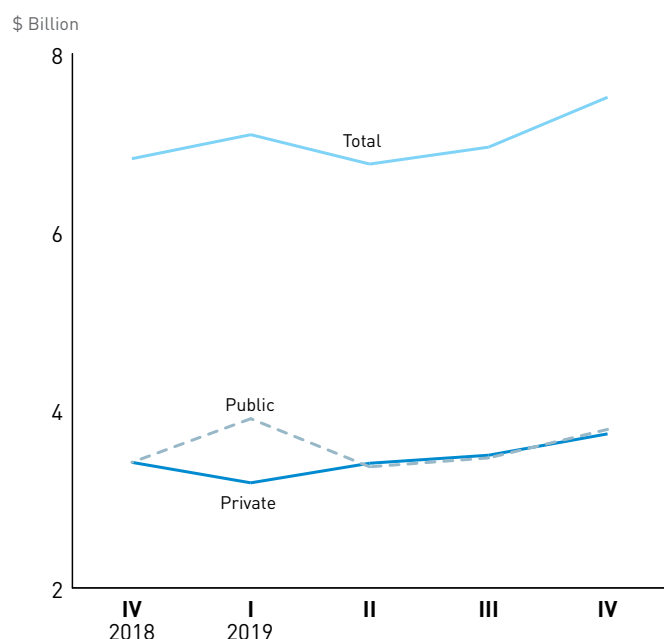
Private sector construction demand rose in the fourth quarter (5.9 per cent) to \$2.6 billion, supported by higher demand for institutional and other building works (183 per cent) and civil engineering works (83 per cent).

For the full year, private sector construction demand expanded by 18 per cent to \$14.5 billion. This was driven by an expansion in construction demand for all development types, except for residential buildings. Specifically, robust demand growth was seen for private civil engineering works (425 per cent), private industrial building works (20 per cent), private commercial building works (31 per cent), and private institutional & others building works (14 per cent). Major projects awarded include commercial developments at Central Boulevard and Beach Road, Changi Airport Terminal 2 upgrading works, and major investments in petrochemical facilities.

## CONSTRUCTION ACTIVITIES

Construction output (or certified payments) increased by 10 per cent year-on-year to \$7.5 billion in the fourth quarter, supported by both public and private sector construction activities (Exhibit 6.6).

Exhibit 6.6: Certified Payments



For the full year, construction output expanded by 6.4 per cent to \$28 billion, reversing the 4.7 per cent decline in 2018. Output was boosted by a pickup in both public and private sector construction activities.

## Public Sector

Public sector construction output increased by 11 per cent to \$3.8 billion in the fourth quarter. This was attributable to an expansion in on-site construction activities for all development types, except for residential building works, which saw a 10 per cent decline in output.

For the full year, public sector construction output rose by 6.3 per cent to \$15 billion, boosted by a step-up in construction activities for industrial building (37 per cent), institutional & others building (5.5 per cent) and civil engineering (8.7 per cent) projects. Major projects supporting the growth in public sector construction activities include JTC's business park development at the Punggol Digital District, PUB's Tuas Water Reclamation Plant, MOH's various healthcare facilities, and LTA's Thomson-East Coast MRT Line.

## Private Sector

In the fourth quarter, private sector construction output rose by 9.3 per cent, underpinned by an expansion in residential (12 per cent), industrial (34 per cent) and institutional & others (16 per cent) building works.

For the whole of 2019, private sector construction output grew by 6.5 per cent to reach \$14 billion. Growth was supported by an increase in residential (6.0 per cent), industrial (30 per cent) and institutional & others (20 per cent) building works. Some of the major on-going projects include a semiconductor fabrication plant, petrochemical facilities, data centres, international schools and religious facilities.

## CONSTRUCTION MATERIALS

In line with the pickup in construction activities, total consumption of ready-mixed concrete increased by 8.4 per cent to 13 million m<sup>3</sup> in 2019. However, the total consumption of steel rebars<sup>1</sup> eased from 1.43 million tonnes in 2018 to 1.37 million tonnes in 2019.

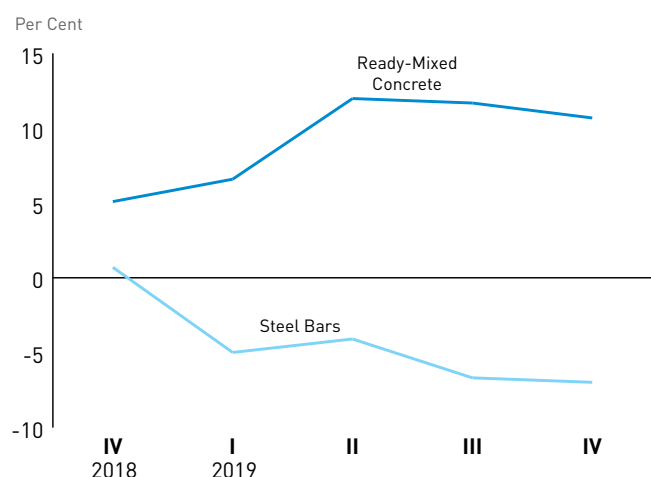
Due to higher raw material prices, the average market price of Grade 40 pump ready-mixed concrete<sup>2</sup> rose by 11 per cent year-on-year to about \$96 per m<sup>3</sup> in the fourth quarter (Exhibit 6.7). The average market price of steel rebar<sup>3</sup> hovered at around \$749 per tonne in the first quarter of 2019 before softening to \$720 in the fourth quarter, due to sluggish global demand amidst the protracted US-China trade conflict.

<sup>1</sup> Rebar consumption is estimated from net imports plus local production (without factoring in stock levels).

<sup>2</sup> The market prices are based on contracts with non-fixed price, fixed price and market retail price.

<sup>3</sup> The market prices refer to 16mm to 32mm High Tensile rebar and are based on fixed price supply contracts with a contract period of 12 months or below.

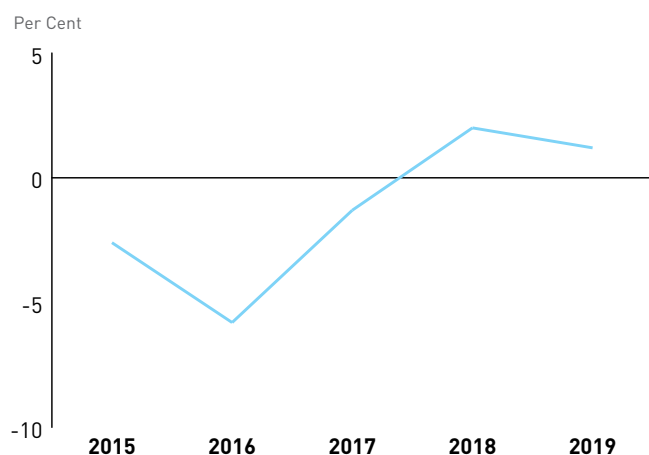
Exhibit 6.7: Changes in Market Prices of Construction Materials



## CONSTRUCTION COSTS

Based on BCA's Building Works Tender Price Index (TPI), tender prices in the construction sector rose by 1.2 per cent in 2019, mainly due to upticks in price inflation for construction resources, particularly ready-mixed concrete and construction plant and equipment (Exhibit 6.8). While construction demand improved further in 2019, contractors continued to submit competitive prices to replenish their order books amidst cautious market sentiments arising from heightened global economic uncertainties.

Exhibit 6.8: Changes in Tender Price Index



## CONSTRUCTION OUTLOOK IN 2020

According to BCA, total construction demand is projected to come in between \$28 billion and \$33 billion in 2020<sup>4</sup> (Exhibit 6.9). Demand from the public sector is expected to continue to stay firm, at between \$17.5 billion and \$20.5 billion, accounting for around 62 per cent of total construction demand. The support for public sector construction demand comes from an anticipated increase in the demand for major infrastructure works which are larger and more complex in scale. Private sector construction demand is projected to moderate to between \$10.5 billion and \$12.5 billion<sup>5</sup> in 2020. Demand is expected to be supported by the redevelopment of the remaining en-bloc sales sites transacted before July 2018, recreational developments at Mandai Park, and the construction of berth facilities at Jurong Port and Tanjong Pagar Terminal.

Exhibit 6.9: Projected Construction Demand in 2020

	\$ Billion
<b>Public Sector</b>	<b>17.5 – 20.5</b>
<b>Building Construction Sub-total</b>	<b>7.5 – 9.3</b>
Residential	2.8 – 3.2
Commercial	0.3 – 0.4
Industrial	1.7 – 2.1
Institutional & Others	2.8 – 3.6
<b>Civil Engineering Works Sub-total</b>	<b>10.0 – 11.2</b>
<b>Private Sector</b>	<b>10.5 – 12.5</b>
<b>Building Construction Sub-total</b>	<b>9.5 – 11.3</b>
Residential	3.6 – 4.0
Commercial	1.1 – 1.7
Industrial	3.3 – 3.8
Institutional & Others	1.5 – 1.8
<b>Civil Engineering Works Sub-total</b>	<b>1.0 – 1.2</b>
<b>TOTAL CONSTRUCTION DEMAND</b>	<b>28.0 – 33.0</b>

<sup>4</sup> BCA's construction demand outlook in 2020 has not taken into consideration the impact of the 2019 Coronavirus Disease (COVID-19).

<sup>5</sup> The private sector construction demand projection in 2020 has not factored in any potential award of the expansion of the two Integrated Resorts by Marina Bay Sands and Resorts World Sentosa.



Total construction output in 2020 is projected to increase further to between \$30 billion and \$32 billion, on the back of the rebound in construction demand since 2018 following the slowdown from 2015 to 2017.

## 6.3 WHOLESALE & RETAIL TRADE

### OVERVIEW

The wholesale & retail trade sector contracted by 1.9 per cent year-on-year in the fourth quarter of 2019, moderating from the 3.5 per cent contraction in the previous quarter.

For the whole of 2019, the sector shrank by 2.9 per cent, a reversal from the 2.8 per cent growth in 2018, with both the wholesale trade and retail trade segments registering contractions.

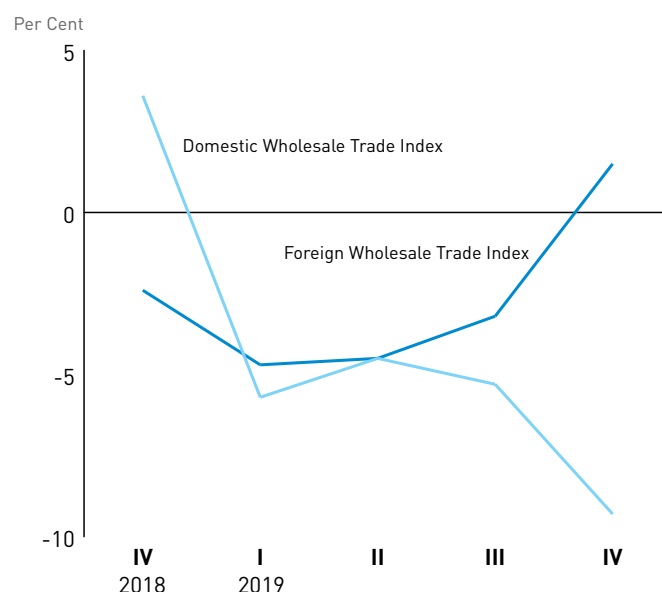
### WHOLESALE TRADE

In the fourth quarter, the wholesale trade segment was weighed down by a decline in domestic wholesale sales volume, which was partially offset by an increase in foreign wholesale sales volume.

The domestic wholesale sales volume declined by 9.3 per cent year-on-year in the fourth quarter, worsening from the 5.3 per cent contraction in the preceding quarter (Exhibit 6.10). The decline was led by weaker sales volumes of petroleum & petroleum-related products (-13 per cent), electronic components (-24 per cent) and chemicals & chemical-related products (-26 per cent), which outweighed an increase in the sales volume of telecommunications & computers (9.9 per cent). For the whole of 2019, the domestic wholesale trade index declined by 6.2 per cent, a reversal from the 0.8 per cent increase in 2018.

On the other hand, foreign wholesale sales volume grew by 1.5 per cent year-on-year in the fourth quarter, an improvement from the 3.2 per cent decline in the preceding quarter. The expansion was largely due to a pickup in the sales volumes of metals, timber & construction materials (13 per cent) and petroleum & petroleum-related products (1.3 per cent). Nevertheless, these increases were partly offset by a 3.9 per cent decline in the sales volume of other wholesale trade.<sup>6</sup> For the full year, the foreign wholesale trade index fell by 2.7 per cent, reversing from the increase of 0.9 per cent in 2018.

Exhibit 6.10: Changes in Wholesale Trade Index at Constant Prices

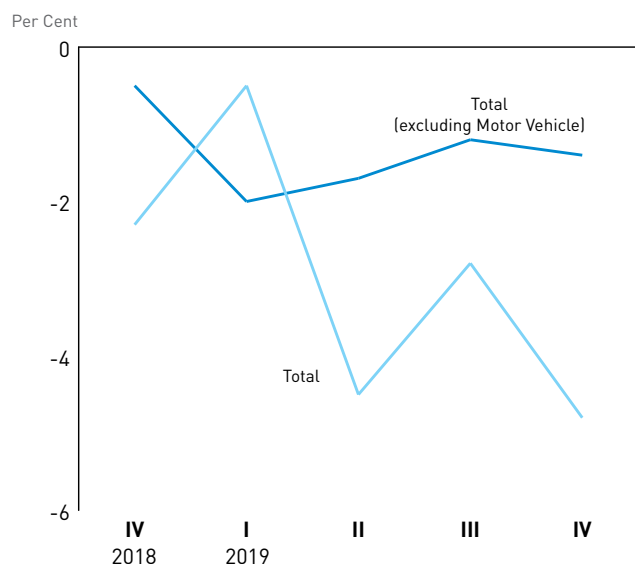


<sup>6</sup> The "other wholesale trade" segment consists of a diverse range of products that includes agricultural raw materials and live animals, tropical produce, personal effects and medicinal and pharmaceutical products, among others.

## RETAIL SALES

Retail sales volume shrank by 4.8 per cent year-on-year in the fourth quarter, worse than the 2.8 per cent decline recorded in the third quarter (Exhibit 6.11). Retail sales were weighed down by both motor vehicle and non-motor vehicle sales. Motor vehicle sales volume fell by 23 per cent on the back of an on-year decline in COE supply, while non-motor vehicle sales volume contracted by 1.4 per cent, led by a fall in the sales volume of discretionary goods. Specifically, the sales volumes of discretionary goods such as furniture & household equipment (-7.3 per cent), watches & jewellery (-3.9 per cent) and department stores (-4.9 per cent) declined. By contrast, the sales volumes of non-discretionary goods such as medical goods & toiletries (1.8 per cent) and mini-marts & convenience stores (2.1 per cent) rose.

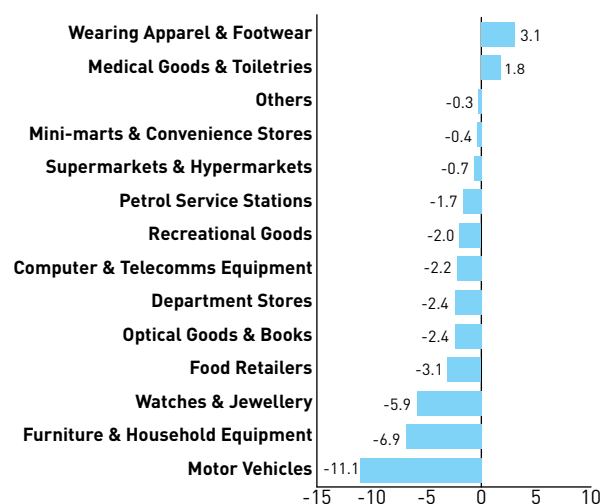
Exhibit 6.11: Changes in Retail Sales Index at Constant Prices



For the full year, retail sales volume fell by 3.2 per cent, a larger drop compared to the 1.2 per cent decline registered in 2018. Retail sales volume was weighed down by both motor vehicle sales (-11 per cent) and non-motor vehicle sales (-1.6 per cent).

The decline in motor vehicle sales in 2019 was in line with a fall in COE supply. Meanwhile, the drop in non-motor vehicle sales was underpinned by a contraction in the sales volumes of both discretionary and non-discretionary goods. For discretionary goods, the decline was driven by lower sales volumes of furniture & household equipment (-6.9 per cent) and watches & jewellery (-5.9 per cent). Meanwhile, the retail sales volumes of supermarkets & hypermarkets (-0.7 per cent), petrol service stations (-1.7 per cent) and food retailers (-3.1 per cent) fell, thereby contributing to the decline in the overall sales volume of non-discretionary goods (Exhibit 6.12).

Exhibit 6.12: Changes in Retail Sales Index at Constant Prices for Major Segments in 2019



## 6.4 ACCOMMODATION & FOOD SERVICES

### OVERVIEW

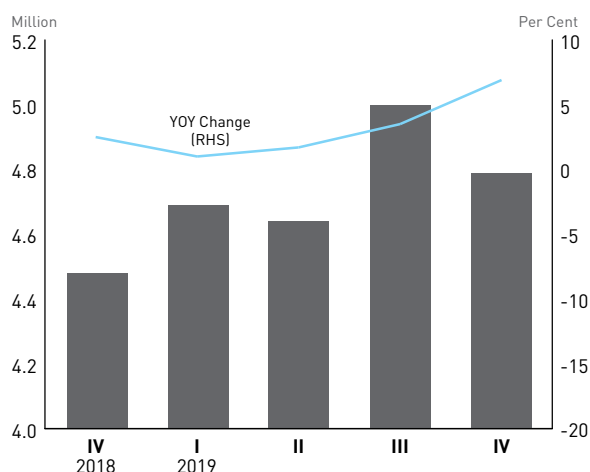
The accommodation & food services sector expanded by 2.5 per cent year-on-year in the fourth quarter of 2019, faster than the 1.9 per cent growth in the previous quarter.

For the whole of 2019, the sector grew by 1.9 per cent, easing from the 3.1 per cent growth in 2018. Growth was supported by both the accommodation and food services segments.

### VISITOR ARRIVALS

Singapore received a total of 4.8 million visitors in the fourth quarter, 6.9 per cent higher compared to the same period a year ago (Exhibit 6.13). The increase came on the back of a rise in visitor arrivals from key markets such as Indonesia (11 per cent), China (10 per cent) and Australia (11 per cent).

Exhibit 6.13: Visitor Arrivals

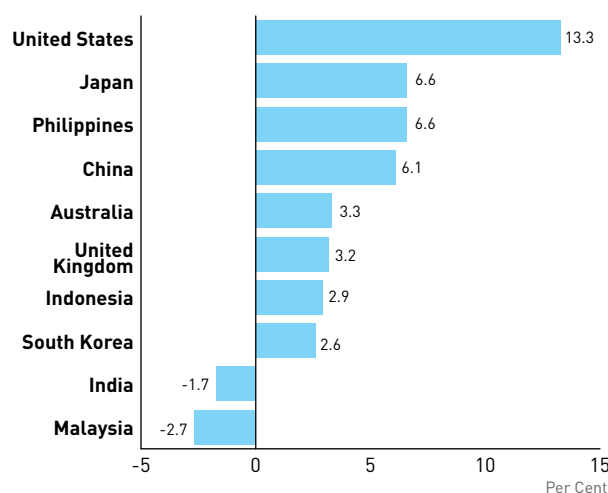


For the full year, visitor arrivals rose by 3.3 per cent, slower than the 6.2 per cent growth in 2018. In total, visitor arrivals reached 19.1 million in 2019.

In terms of source markets, Singapore's top five visitor-generating markets in 2019 were China (3.6 million visitors), Indonesia (3.1 million), India (1.4 million), Malaysia (1.2 million) and Australia (1.1 million). Together, they accounted for 55 per cent of total visitor arrivals in 2019.

Among the top 10 visitor-generating markets, the United States (13 per cent), Japan (6.6 per cent) and the Philippines (6.6 per cent) posted the highest growth rates in visitor arrivals in 2019 (Exhibit 6.14).

Exhibit 6.14: Growth Rates of Top Ten Visitor Generating Markets in 2019

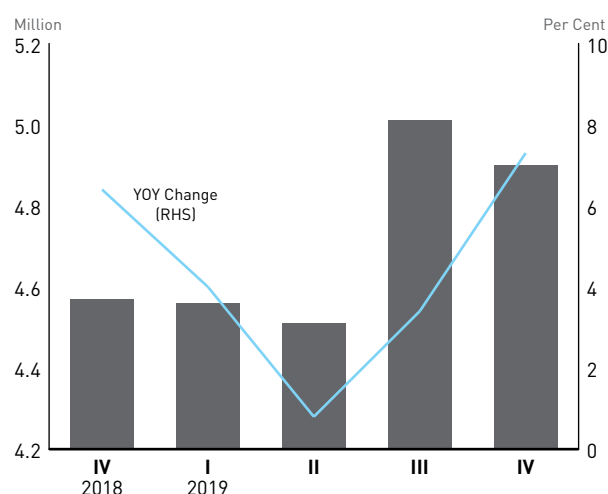


## ACCOMMODATION

In line with the increase in visitor arrivals, the gross lettings of gazetted hotels rose by 7.3 per cent year-on-year in the fourth quarter, picking up from the 3.4 per cent growth seen in the preceding quarter (Exhibit 6.15). Similarly, room revenue grew by 12 per cent, accelerating from the 6.4 per cent increase in the third quarter. The increase in room revenue was due to an improvement in the average occupancy rate of gazetted hotels, as well as higher average daily room rate. Specifically, the average occupancy rate rose by 2.7 percentage-points on-year to reach 87 per cent in the fourth quarter, while the average daily room rate increased by 4.0 per cent on-year to \$229.

For the full year, the performance of the accommodation segment was robust. The overall room revenue of gazetted hotels rose by 5.5 per cent to reach \$4.2 billion in 2019 on the back of a 3.9 per cent increase in gross lettings.

Exhibit 6.15: Gross Lettings

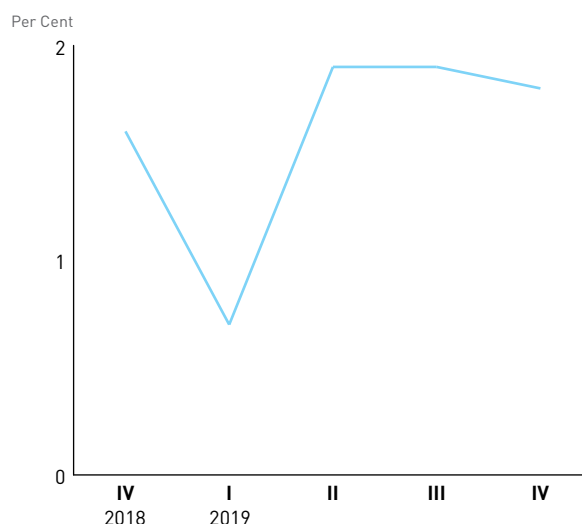


## FOOD SERVICES

Overall food & beverage sales volume expanded by 1.8 per cent year-on-year in the fourth quarter, extending the 1.9 per cent increase in the preceding quarter (Exhibit 6.16). Growth came on the back of a pickup in sales volumes at restaurants (2.7 per cent), fast food outlets (7.1 per cent) and other eating places<sup>7</sup> (1.4 per cent). By contrast, sales volume at food caterers fell by 7.0 per cent.

For the whole of 2019, the food & beverage services index rose by 1.6 per cent. This marked a turnaround from the 0.2 per cent decline recorded in 2018. The increase in the index in 2019 was due to higher sales volumes at fast food outlets (6.2 per cent), restaurants (1.5 per cent) and other eating places (1.4 per cent). These increases were partially offset by a 3.2 per cent contraction in the sales volume of food caterers.

Exhibit 6.16: Changes in Food and Beverage Services Index at Constant Prices



<sup>7</sup> Other eating places include cafes, coffee houses, food courts, food kiosks, pubs and canteens. Other eating places include cafes, coffee houses, food courts, food kiosks, pubs and canteens.



# 6.5 TRANSPORTATION & STORAGE

## OVERVIEW

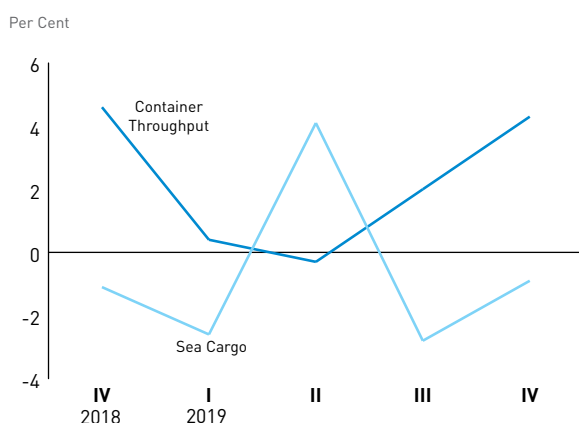
The transportation & storage sector grew by 0.8 per cent year-on-year in the fourth quarter of 2019, improving from the flat growth in the previous quarter.

For the whole of 2019, the sector expanded at a faster pace of 0.8 per cent compared to the flat growth in 2018. Growth was primarily supported by the water transport and air transport segments.

## WATER TRANSPORT

Container throughput rose by 4.3 per cent year-on-year in the fourth quarter, faster than the 2.0 per cent expansion in the previous quarter (Exhibit 6.17). For the full year, the number of TEUs (Twenty-Foot Equivalent Units) handled by Singapore's ports came in at 37 million, 1.6 per cent higher compared to 2018. However, this was a moderation from the 8.7 per cent growth recorded in 2018.

Exhibit 6.17: Changes in Container Throughput and Sea Cargo Handled



Overall sea cargo volumes declined by 0.9 per cent in the fourth quarter, extending the 2.8 per cent fall in the preceding quarter. The drop in sea cargo volumes was largely due to oil-in-bulk cargo shipments, which contracted by 8.3 per cent in the fourth quarter, following the 7.8 per cent decline in the third quarter.

For the whole of 2019, total sea cargo volumes dipped by 0.6 per cent, a reversal from the 0.4 per cent growth in the previous year.

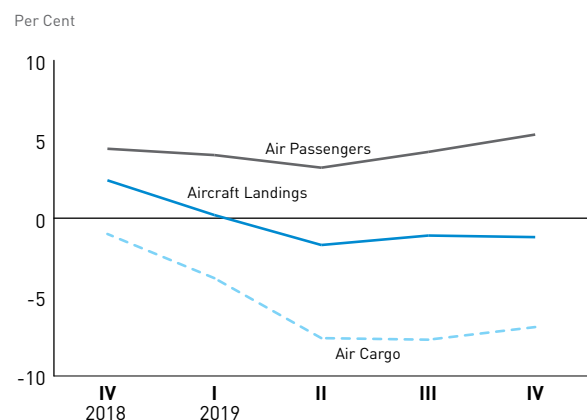
## AIR TRANSPORT

Air passenger traffic handled by Changi Airport rose by 5.3 per cent year-on-year in the fourth quarter, better than the 4.2 per cent increase in the previous quarter (Exhibit 6.18).

For the full year, total air passenger traffic passing through Changi Airport increased by 4.2 per cent to reach 68 million, although this was slower than the 5.4 per cent growth recorded in 2018. Growth during the year was supported by higher air passenger traffic to and from Changi Airport's key markets, including China, South East Asia and Oceania.

On the other hand, air cargo volumes contracted by 6.9 per cent year-on-year in the fourth quarter, extending the 7.7 per cent fall in the previous quarter. This came on the back of a decline in our non-oil domestic exports, particularly electronics exports. For 2019 as a whole, air cargo shipments fell by 6.5 per cent, a reversal from the 1.4 per cent increase in 2018.

Exhibit 6.18: Changes in Air Transport



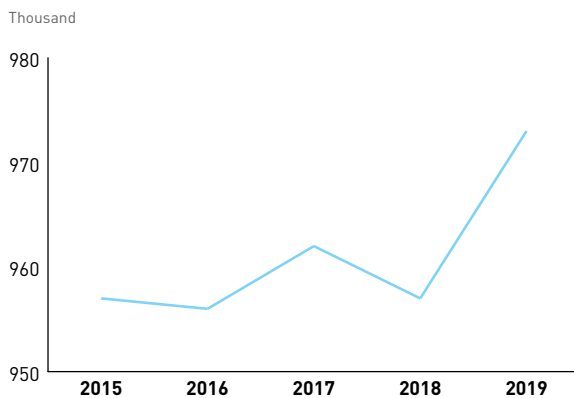
Meanwhile, after declining by 1.1 per cent in the third quarter, aircraft landings contracted by 1.2 per cent year-on-year to reach 48,449 in the fourth quarter. This brought the total number of aircraft landings for the full year to 191,164, which was 1.0 per cent lower as compared to 2018.

## LAND TRANSPORT

As of December 2019, the total number of vehicles registered with the Land Transport Authority (LTA) was 973,101, 1.7 per cent higher than that in December 2018 (Exhibit 6.19).

The vehicles registered as at December 2019 comprised 555,540 private and company cars, 77,141 rental cars, 18,542 taxis, 19,661 buses, 140,891 motorcycles and scooters, and 161,326 goods vehicles and other vehicle types.

*Exhibit 6.19: Motor Vehicles Registered*



## 6.6

# INFORMATION & COMMUNICATIONS

### OVERVIEW

The information & communications sector expanded by 4.5 per cent year-on-year in the fourth quarter of 2019, extending the 4.4 per cent growth in the previous quarter. Growth was supported by the IT & information services and telecommunications segments.

For the whole of 2019, the sector posted growth of 4.3 per cent, slowing from the 6.5 per cent increase registered in 2018.

### IT & INFORMATION SERVICES

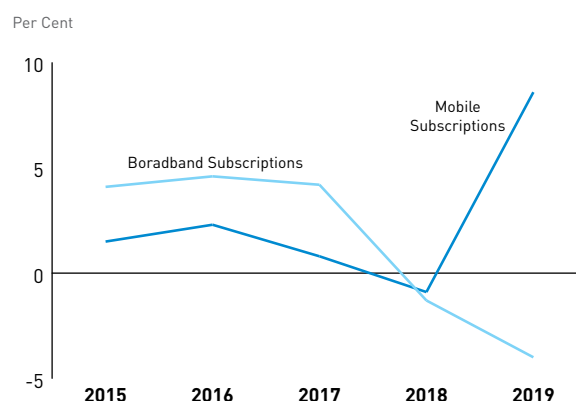
In 2019, the growth of the information & communications sector was supported by the healthy performance of the IT & information services segment. Specifically, the IT & information services segment grew by 6.9 per cent on the back of robust demand for services such as software development, web hosting and web portals, as well as information technology consultancy

### TELECOMMUNICATIONS

As at November 2019<sup>8</sup>, the number of mobile subscriptions was 8.6 per cent higher compared to the same period in 2018. This was driven by a 13 per cent increase in 4G subscriptions, with the total number of 4G subscriptions reaching 7.4 million. By contrast, the number of 3G subscriptions fell by 8.4 per cent to 1.6 million.

In 2019, the number of broadband subscriptions dipped by 4.0 per cent. This was due to a 4.6 per cent decline in wireless broadband subscriptions, led primarily by fewer Wireless@SG subscriptions. Nevertheless, the decline was partially offset by a 11 per cent increase in optical fibre subscriptions.

Exhibit 6.20: Changes in Mobile and Broadband Subscriptions



# 6.7 FINANCE & INSURANCE

## OVERVIEW

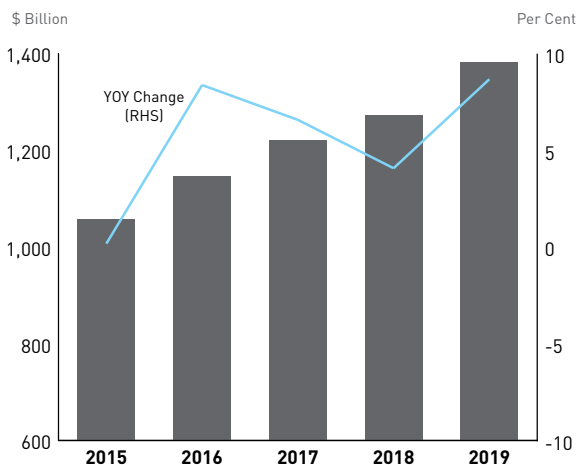
The finance & insurance sector grew by 4.0 per cent year-on-year in the fourth quarter of 2019, extending the 4.1 per cent expansion recorded in the previous quarter.

For the whole of 2019, the sector expanded by 4.1 per cent, a step-down from the 7.2 per cent growth in the preceding year.

## COMMERCIAL BANKS

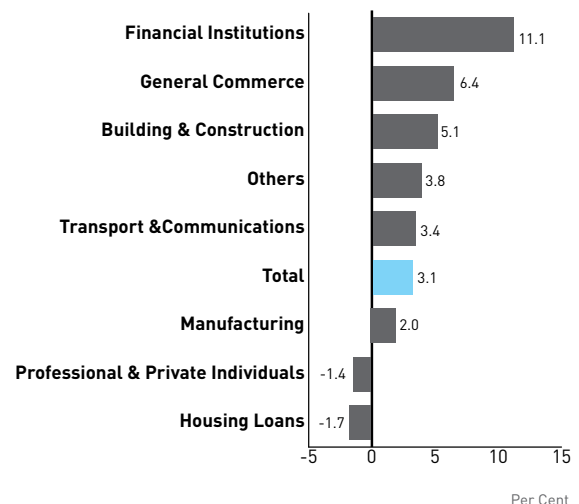
In 2019, total assets/liabilities of commercial banks increased by 8.7 per cent to \$1.4 trillion (Exhibit 6.21). Both domestic non-bank and interbank lending expanded, with credit extended to non-bank customers rising by \$21 billion (3.1 per cent).

Exhibit 6.21: Total Assets and Liabilities of Commercial Banks



Business lending rose by 5.9 per cent in 2019, improving from the 4.1 per cent growth in the preceding year. Loans to professional & private individuals for business purposes fell, but this was offset by stronger growth in loans to non-bank financial institutions, the general commerce sector, and the building & construction sector (Exhibit 6.22). Meanwhile, consumer lending contracted by 1.3 per cent, due to a decline in housing and share financing loans.

Exhibit 6.22: Growth of Bank Loans and Advances to Non-Bank Customers by Industry in 2019

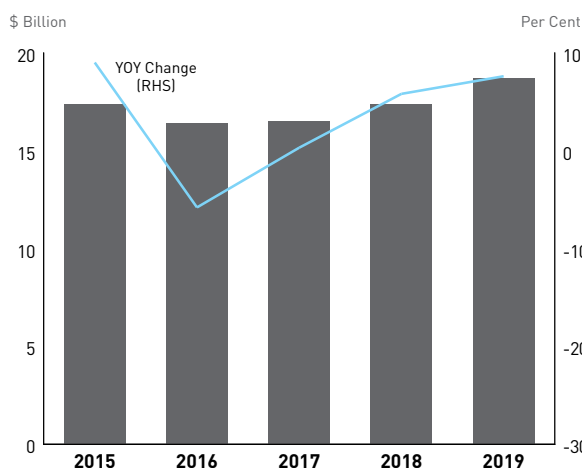


On the liabilities front, the total deposits of non-bank customers grew by 8.9 per cent in 2019, stepping up from the 3.5 per cent rise in 2018. As at end-2019, total non-bank deposits stood at \$684 billion, higher than the \$628 billion the year before, driven by strong demand for fixed deposits.

## FINANCE COMPANIES

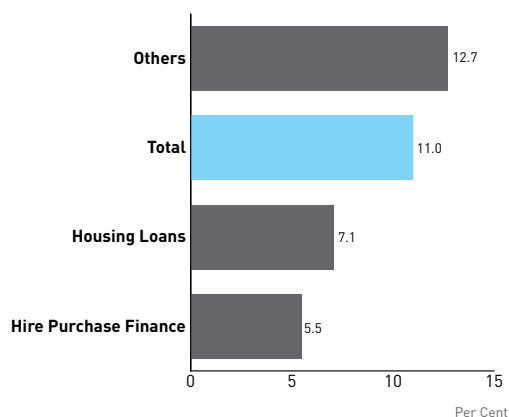
Total assets/liabilities of finance companies increased by 7.6 per cent in 2019, up from the 5.8 per cent expansion in 2018 (Exhibit 6.23).

Exhibit 6.23: Total Assets and Liabilities of Finance Companies



Non-bank lending grew by 11 per cent in 2019, a significant pickup from the 3.2 per cent growth recorded the year before, primarily driven by higher credit extended to the building & construction segment (Exhibit 6.24).

Exhibit 6.24: Growth of Loans and Advances of Finance Companies in 2019



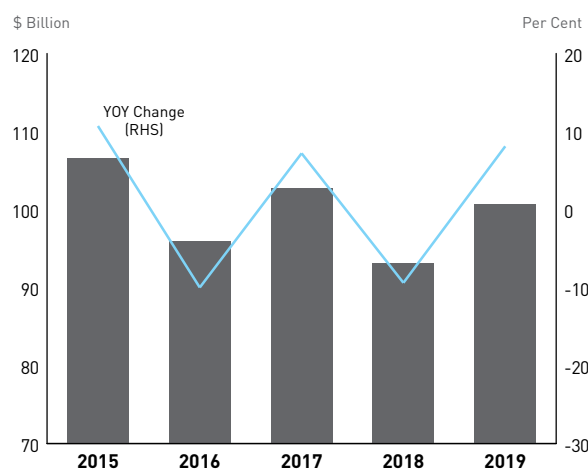
On the liabilities front, deposits of non-bank customers rose by 8.2 per cent in 2019, faster than the 6.4 per cent growth in 2018.

## MERCHANT BANKS

Total asset/liabilities of merchant banks expanded by 8.1 per cent to \$101 billion as at end-2019, from the \$93 billion recorded in the previous year (Exhibit 6.25). The increase stemmed from the offshore segment, which registered strong growth in interbank lending.

By contrast, the domestic operations of merchant banks contracted by 7.0 per cent, reversing the 8.1 per cent growth posted in 2018.

Exhibit 6.25: Total Assets and Liabilities of Merchant Banks

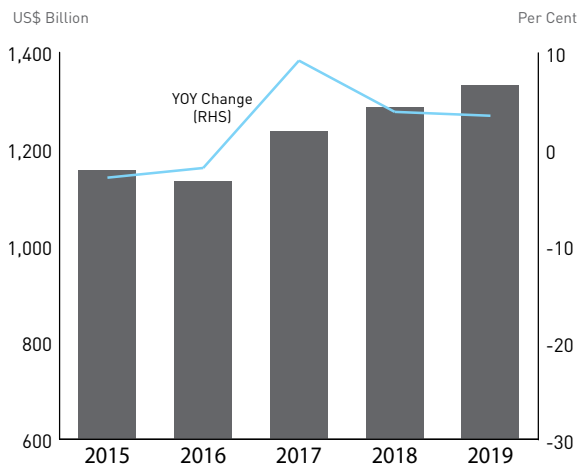
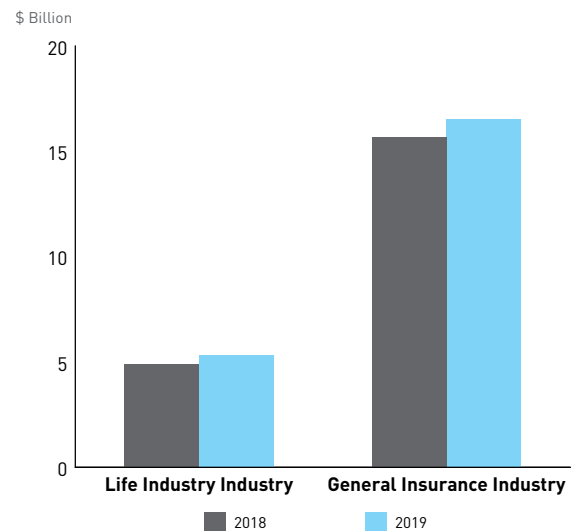


## ASIAN DOLLAR MARKET

Total assets/liabilities of the Asian Dollar Market rose by 3.5 per cent in 2019, moderating from the 3.9 per cent growth in the previous year (Exhibit 6.26). Growth in non-bank loan volumes picked up to 6.2 per cent, from the 5.0 per cent increase in the previous year, owing to an improvement in credit extended to East Asia. Meanwhile, interbank loans contracted by 3.8 per cent, reversing the 1.6 per cent expansion in 2018.

On the liabilities front, non-bank deposits rose by 8.2 per cent, driven by an increase in foreign currency deposits by both residents and non-residents. Conversely, interbank deposits shrank by 5.6 per cent, reversing the 2.3 per cent growth registered in the previous year.



*Exhibit 6.26: Total Assets and Liabilities of the Asian Dollar Market**Exhibit 6.27: Premiums in the Insurance Industry*

## INSURANCE INDUSTRY

Total weighted new business premiums in the direct life insurance industry grew by 7.8 per cent to \$5.3 billion in 2019. Single premium business decreased by 10 per cent to \$14 billion and regular premium business grew by 16 per cent to \$3.9 billion in 2019. Overall, the net income of the direct life insurance industry increased to \$2.8 billion, from \$588 million in 2018, largely due to higher investment income.

In the general insurance industry, gross premiums edged up by 5.6 per cent to \$17 billion in 2019, with offshore and domestic businesses accounting for \$12 billion and \$4.3 billion respectively. The general insurance industry recorded an operating profit of \$373 million in 2019, a 155 per cent increase from 2018. This was attributable to improved underwriting performance as compared to 2018.

## CENTRAL PROVIDENT FUND

Total CPF balances increased by 8.7 per cent to \$425 billion in 2019.

Members' contributions for the year amounted to \$40 billion, while total withdrawals reached \$21 billion, similar to the level recorded in 2018.

Total net withdrawals for housing (HDB flats and private properties) grew by 4.8 per cent to reach \$230 billion as at 31 December 2019.

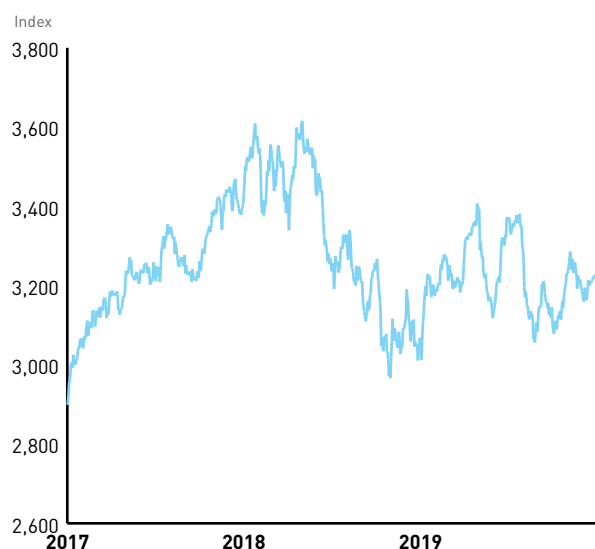
As at 31 December 2019, more than 176,000 CPF members have been included in the national annuity scheme – CPF Lifelong Income for the Elderly (CPF LIFE), which provides lifelong payouts in retirement. The CPF LIFE fund stood at \$11 billion.

## STOCK MARKET

The benchmark Straits Times Index (STI) rose by 5.0 per cent in 2019, supported by accommodative monetary policies of global central banks in the face of slow global growth and elevated uncertainties, which were due in part to the US-China trade tensions.

Movements in the STI in 2019 were largely driven by changes in sentiments linked to developments in US and China relations. Sentiments eventually found a firmer footing towards the end of the year, as signs emerged that both countries would reach a deal that would signal a halt to a further escalation of tensions. Over the course of the year, global central banks like the Federal Reserve and the European Central Bank also demonstrated increased willingness to support growth by adjusting policy settings further.

Exhibit 6.28: Straits Times Index



## SECURITIES MARKET

Compared to 2018, the total turnover value of the securities market decreased by 11 per cent to \$265 billion, and total turnover volume decreased by 32 per cent to 296 billion shares, in 2019. This translated to an 11 per cent fall in the average daily traded value to \$1.1 billion, and a 32 per cent decline in average daily traded volume to 1.2 billion shares.

At the end of 2019, the total number of listed companies in Singapore was 723, with a combined market capitalisation of \$938 billion, a 0.1 per cent increase from 2018. 507 of the companies were listed on SGX's Mainboard, while the other 216 companies were listed on SGX's Catalyst.

## DERIVATIVES MARKET

In 2019, SGX's derivatives market activity increased by 10 per cent to 240 million contracts. Compared to 2018, total futures trading volume increased by 10 per cent to 224 million, while options on futures trading volume grew by 13 per cent to 16 million contracts. The most actively-traded contracts were the FTSE China A50 Index Futures, the Nikkei 225 Stock Index and the MSCI Taiwan Index Futures, which formed 59 per cent of the total volume traded on SGX's derivatives trading platform.

## FOREIGN EXCHANGE MARKET

In 2019, the British Pound and Japanese Yen strengthened by 3.9 per cent and 1.0 per cent against the US Dollar respectively, while the Euro fell by 2.2 per cent. The Pound outperformed as the UK and EU successfully negotiated an agreement for UK's exit from the EU, resulting in a reduction in Brexit uncertainty. The Yen rose slightly as the Bank of Japan kept its monetary policy relatively unchanged throughout the year. The US Dollar was weighed down by the Federal Reserve's decision to cut interest rates three times over the course of the year, while easing trade tensions between US and China towards the end of 2019 also reduced safe haven demand for the US Dollar. Lacklustre growth and inflation data in the Eurozone contributed to the underperformance of the Euro.

## 6.8 BUSINESS SERVICES

### OVERVIEW

The business services sector expanded by 1.7 per cent year-on-year in the fourth quarter of 2019, improving from the 1.1 per cent growth posted in the previous quarter.

For the whole of 2019, the sector grew by 1.4 per cent, easing from the 2.4 per cent growth in 2018. Growth was supported largely by the professional services segment.

### PROFESSIONAL SERVICES

In 2019, the professional services segment posted healthy growth, with all sub-segments registering expansions. The growth of the segment was largely driven by the head offices & business representative offices and architectural & engineering, technical testing & analysis sub-segments, which grew by 5.6 per cent and 4.7 per cent respectively in 2019.

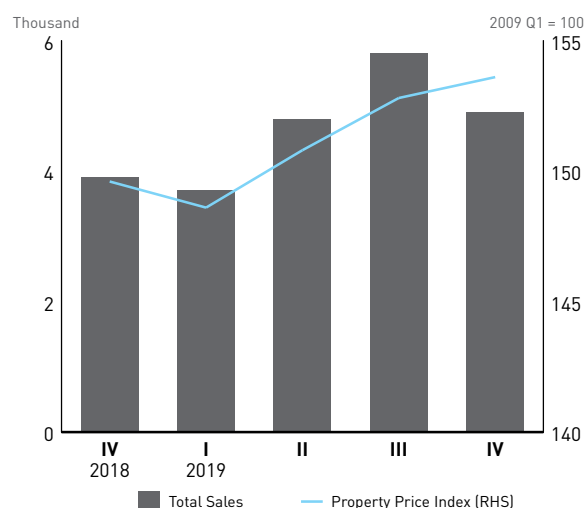
### REAL ESTATE

The real estate segment mounted a recovery in 2019, growing marginally by 0.3 per cent, compared to the 0.7 per cent contraction in 2018.

The private residential property market remained firm in the fourth quarter. On a quarter-on-quarter basis, private residential property prices rose by 0.5 per cent, moderating from the 1.3 per cent increase in the preceding quarter. For the whole of 2019, prices increased at a more gradual pace of 2.7 per cent compared to the 7.9 per cent growth in 2018.

Private residential property sales volume also increased in the fourth quarter. Specifically, private residential property sales increased by 26 per cent year-on-year, rebounding from the 0.03 per cent contraction in the third quarter. For the full year, however, total sales declined by 14 per cent to 19,150 units, compared to the 22,139 units sold in 2018 (Exhibit 6.29).

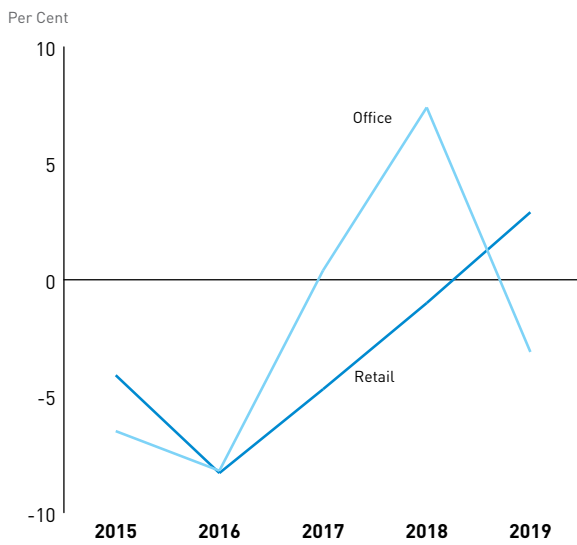
Exhibit 6.29: Total Sales of Private Residential Units and Private Residential Property Price Index



In the commercial space segment, the retail space market improved in 2019. Private retail space rentals rose by 2.9 per cent, reversing the 1.0 per cent decline in the previous year (Exhibit 6.30). The improved performance was due to higher rentals in the Central Area (3.3 per cent) and Fringe Area (2.7 per cent). In tandem with the increase in rentals, the prices of private retail space rose by 1.3 per cent in 2019, picking up from the 0.6 per cent growth in 2018. While prices in the Central Area fell by 2.3 per cent, this was more than offset by higher prices in the Fringe Area (3.3 per cent).

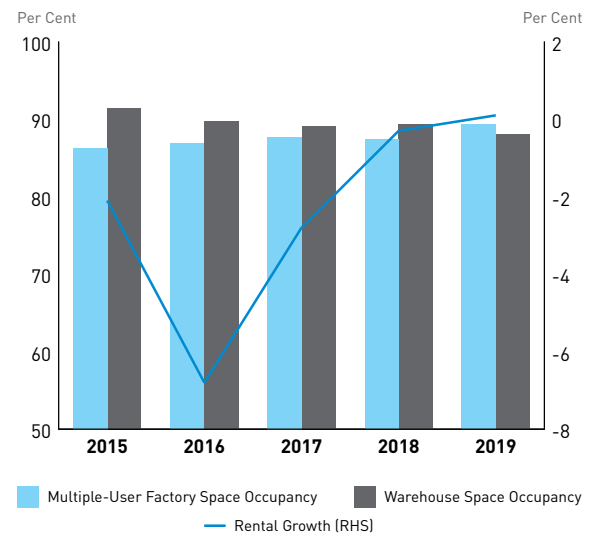
Following a robust 5.7 per cent increase in 2018, prices in the office space market eased to register a decline of 0.6 per cent in 2019. Similarly, private office space rentals fell by 3.1 per cent in 2019, reversing the 7.4 per cent increase in the previous year (Exhibit 6.30). The decline in office rentals was due to lower rentals in both the Central Area (-3.1 per cent) and Fringe Area (-1.3 per cent).

*Exhibit 6.30: Changes in Rentals of Private Sector Office and Retail Spaces*



In the industrial space market, overall prices of industrial properties remained broadly stable, dipping slightly by 0.3 per cent in 2019, following the flat growth recorded in 2018. Meanwhile, overall rentals grew marginally by 0.1 per cent, reversing the 0.3 per cent decline in the previous year. In particular, the rentals of private single-user factory space stabilised, rising by 0.5 per cent in 2019, a reversal from the 1.9 per cent decline in 2018 (Exhibit 6.31).

*Exhibit 6.31: Occupancy Rate and Rental Growth of Industrial Space*



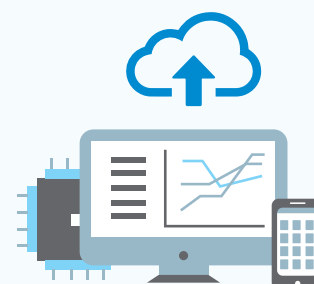


## BOX ARTICLE 6.1

## Trends in E-commerce in the Services Sector

## INTRODUCTION

Electronic commerce (or e-commerce) generally refers to the sale of goods or services through electronic networks such as the internet, and offers benefits for firms adopting it. For instance, firms can leverage e-commerce to transcend geographical barriers to reach a wider market. E-commerce can also reduce the barriers to entry for new firms. Lastly, e-commerce can help firms to achieve a leaner workforce, thereby resulting in productivity gains for firms. This article seeks to examine the trends in e-commerce in the services sector<sup>1</sup> over the period of 2016 to 2018.

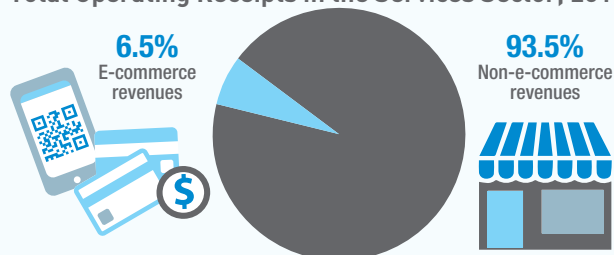


## KEY E-COMMERCE TRENDS IN THE SERVICES SECTOR

The contribution of e-commerce revenues to total operating receipts of the services sector has grown over time.

In 2018, total e-commerce revenues for the services sector was \$237 billion. This represented approximately 6.5 per cent of the total operating receipts<sup>2</sup> earned by firms in the services sector in 2018, which was higher than the 6.3 per cent registered in 2016. In particular, the e-commerce revenue share was the highest in the information & communications, accommodation and transportation & storage industries.

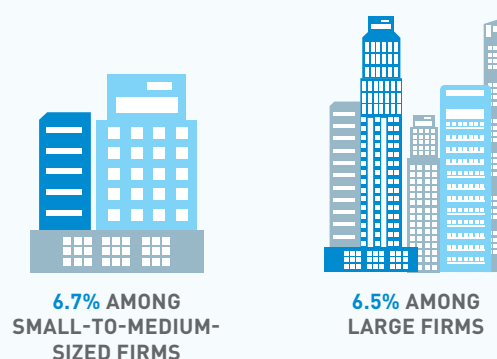
## Total Operating Receipts in the Services Sector, 2018



Small-to-medium-sized firms and large firms derived a broadly similar proportion of their operating receipts from e-commerce transactions.

For the services sector as a whole, the e-commerce share of operating receipts for small-to-medium-sized firms was 6.7 per cent in 2018, comparable to the 6.5 per cent for large firms.

## E-commerce Revenue Share of Operating Receipts in the Services Sector, 2018



## POLICY TAKEAWAY

While most of the industries in the services sector have seen an increase in e-commerce adoption, there is scope for firms across all industries to do more. Through initiatives like the SMEs Go Digital programme, the Government will help firms in their transformation efforts and enable them to take advantage of the vast opportunities that come from digitalisation and e-commerce.



<sup>1</sup> In this article, the services sector excludes financial & insurance services and public administration activities.

<sup>2</sup> Comprising both e-commerce and non-e-commerce revenue.

## TRENDS IN E-COMMERCE IN THE SERVICES SECTOR

This article presents the trends in electronic commerce (or e-commerce) among firms in Singapore's services sector over the period of 2016 to 2018.

### E-commerce can bring about benefits to firms

E-commerce generally refers to the sale of goods or services through electronic networks such as the internet. This form of transaction has become more prevalent for both the business-to-consumer (B2C) and business-to-business (B2B) segments in recent years. For instance, it has become more common for consumers to purchase clothes online or book a taxi ride through their mobile devices. Firms are also increasingly sourcing for and purchasing inputs through their suppliers' websites or third-party B2B marketplaces (e.g., Eezee) that connect buyers with suppliers or importers with exporters.

Broadly, firms can derive several benefits from the adoption of e-commerce. First, e-commerce allows firms to transcend geographical barriers to reach a wider market, as customers (including those based overseas) can purchase goods and services without having to be physically present at their stores. Second, e-commerce can reduce the barriers to entry for new firms, as they can save on upfront set-up costs such as rentals. Third, as with other forms of digitalisation, adopting e-commerce can help firms to achieve a leaner workforce as it facilitates the automation of processes such as billing and inventory management, thereby leading to productivity gains for firms. Given the potential benefits of e-commerce, there is a need to better understand the extent of e-commerce adoption by firms in Singapore.

In this article, we examine the trends in e-commerce in the services sector<sup>3</sup> over the period of 2016 to 2018 using e-commerce revenue<sup>4</sup> data from the Annual Survey of Services conducted by the Department of Statistics (DOS).<sup>5</sup>

### E-commerce revenue accounted for 6.5 per cent of the total operating receipts of the services sector in 2018, with the share having seen a gradual increase since 2016

In 2018, the total amount of e-commerce revenue earned by firms in the services sector was \$237 billion, or 6.5 per cent of the total operating receipts<sup>6</sup> of firms in the sector. Within the sector, the top three contributors to e-commerce revenue in 2018 were the wholesale trade (66 per cent), information & communications (18 per cent) and transportation & storage (9.5 per cent) industries [Exhibit 1].

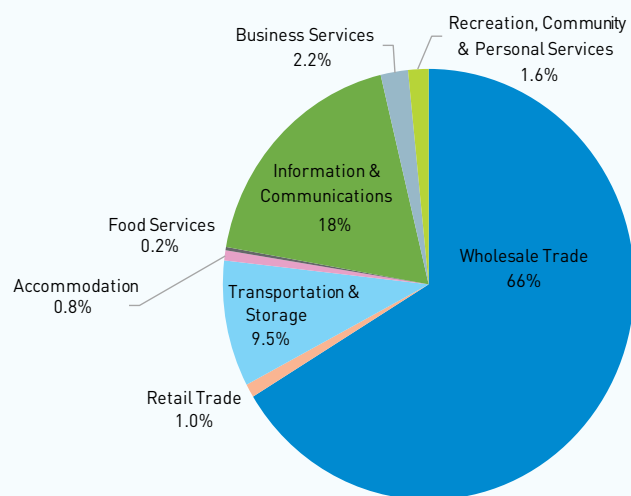
E-commerce penetration (i.e., share of e-commerce revenue to total operating receipts) in the services sector has also increased over time, from 6.3 per cent in 2016 to 6.5 per cent in 2018. This came on the back of a robust 20 per cent increase in e-commerce revenue on a compound annual growth rate (CAGR) basis between 2016 and 2018, a pace that was faster than the 18 per cent CAGR increase seen for non-e-commerce revenue over the same period.

<sup>3</sup> In this article, the services sector excludes financial & insurance services and public administration activities.

<sup>4</sup> E-commerce revenue refers to the revenue earned from the sale of goods and services, where the seller receives the order or agrees on the price and terms of sale via online means, e.g., through the company's website, third-party websites, mobile applications, extranet or Electronic Data Interchange (e.g., Government Electronic Business, or GeBIZ, in Singapore). Payment and delivery may or may not be made online. Telephone calls, facsimile or manually typed e-mail are excluded from this scope.

<sup>5</sup> DOS started collecting data on e-commerce in its Annual Survey of Services from 2016 onwards.

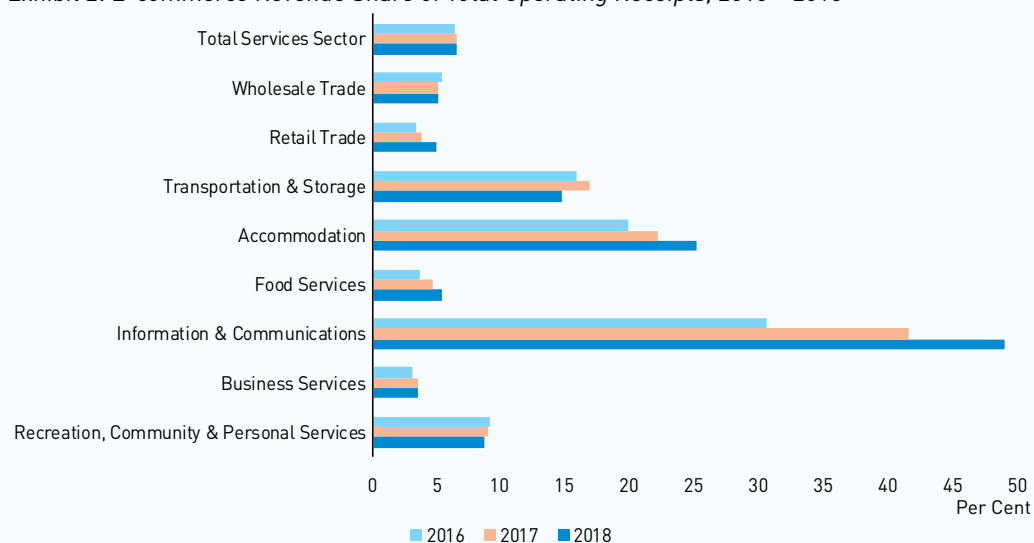
<sup>6</sup> Comprising both e-commerce and non-e-commerce revenue.

*Exhibit 1: Share of Total E-commerce Revenue in Services Sector by Industry, 2018*

Source: Department of Statistics

### Some industries within the services sector have significantly higher levels of e-commerce penetration than others

Within the services sector, the extent of e-commerce penetration varies widely across industries. For instance, the share of e-commerce revenue out of total operating receipts was significantly higher in the information & communications (49 per cent), accommodation (25 per cent) and transportation & storage (15 per cent) industries as compared to the other industries [Exhibit 2]. In addition, the majority of the industries saw a sustained increase in their e-commerce revenue shares between 2016 and 2018. The exceptions were the wholesale trade, transportation & storage, and recreation, community & personal services industries, where the share had remained broadly the same throughout the period.

*Exhibit 2: E-commerce Revenue Share of Total Operating Receipts, 2016 – 2018*

Source: Department of Statistics

Some salient observations by industries are as follows:

- The higher e-commerce penetration seen in the information & communications, accommodation and transportation & storage industries is likely due to the nature of activities in these industries.
  - o Information & communications: The high e-commerce revenue share in the industry can be attributed to the highly digitalised nature of the industry, which includes activities like web portals (e.g., social media sites and online marketplaces), computer programming and software publishing. With the rising prominence of such activities over time, the industry has also seen a significant increase in its e-commerce revenue share, from 30 per cent in 2016 to 49 per cent in 2018. This increase was driven by a robust 49 per cent CAGR rise in its e-commerce revenue from 2016 to 2018, which far outstripped the 0.8 per cent CAGR rise in its non-e-commerce revenue over the same period.
  - o Accommodation: The high e-commerce revenue share in the industry is due to the prevalence of online booking of hotel rooms. Given the increasing popularity of such bookings, the industry has also seen an increase in its e-commerce revenue share, from 20 per cent in 2016 to 25 per cent in 2018.
  - o Transportation & storage: The high e-commerce revenue share in the industry is primarily due to the air transport segment, likely reflecting the prevalence of online flight bookings. The industry's e-commerce revenue share has remained stable over time, at 15 per cent in 2018 compared to 16 per cent in 2016.
- On the other hand, some industries are slower in terms of e-commerce adoption.
  - o Business services: The business services industry had the lowest e-commerce revenue share among all the industries in 2018, at 3.6 per cent. However, there were variations across segments within the industry. The real estate, head office and management consultancy segments had lower e-commerce penetration. This is possibly because transactions in these segments tend to be of higher value and could also be more complex, making them more likely to be conducted in-person. By contrast, segments such as ticket reservation services, which are relatively easier to digitalise, generated a large proportion of their operating receipts from e-commerce.
  - o Retail trade: The retail trade industry had the second-lowest e-commerce revenue share in 2018, at 4.9 per cent. The low e-commerce penetration was due in part to activities such as the retail sales of motor vehicles and petrol, which are transactions that hardly take place over an e-commerce platform. By contrast, segments such as sales by supermarkets & hypermarkets and sales of computer & telecommunication equipment had relatively higher e-commerce revenue shares. It is also encouraging to see that e-commerce revenue growth in the industry has been robust, coming in at 22 per cent on a CAGR basis between 2016 and 2018, much better than its non-e-commerce revenue growth over the same period (-0.2 per cent CAGR). This has led to a rise in the industry's e-commerce revenue share, from 3.3 per cent in 2016 to 4.9 per cent in 2018, suggesting that retailers in Singapore are increasingly leveraging e-commerce in their business.

### While the e-commerce share of total operating receipts for small-to-medium-sized firms is similar to that for large firms in the overall services sector, significant gaps between the two groups exist within specific industries

We next examine the extent of e-commerce penetration across firms of different sizes. In general, larger firms would have more resources and the economies of scale to launch their own e-commerce platforms. However, advancements in information technology and digital payments have also lowered the barriers for smaller firms to adopt e-commerce solutions. For instance, rather than establish their own e-commerce platform, smaller firms can instead sell through an established e-marketplace.

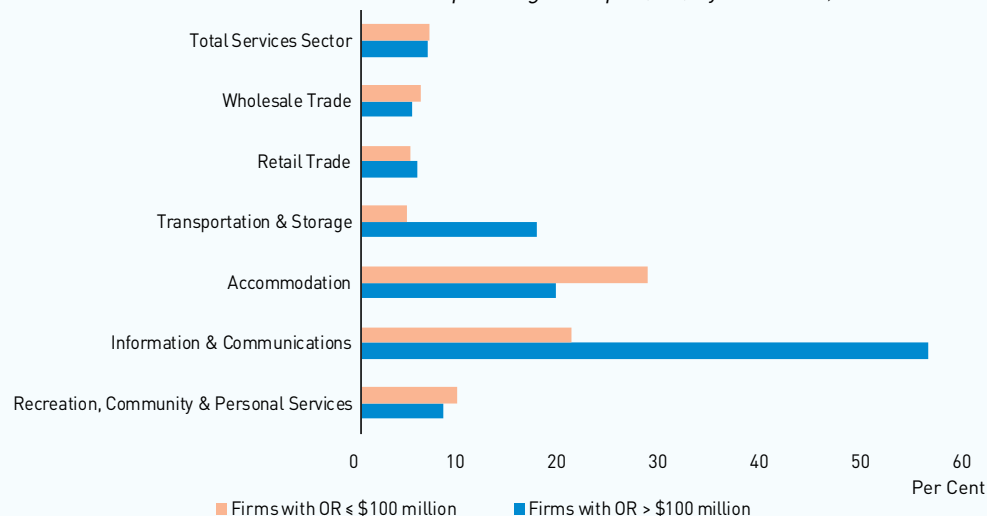
For the purpose of this analysis, we compare the e-commerce share of total operating receipts of small-to-medium-sized firms (defined as firms with operating receipts of not more than \$100 million) against that of large firms (defined as firms with operating receipts of more than \$100 million) within the same industry.

For the overall services sector, we find that the e-commerce revenue share of large firms was 6.5 per cent in 2018, similar to the 6.7 per cent for small-to-medium-sized firms [Exhibit 3]. The e-commerce revenue shares of the two groups of firms were also comparable in industries such as wholesale trade, retail trade, and recreation, community & personal services.

However, we observe wide gaps in the e-commerce revenue shares of small-to-medium-sized firms and large firms in several other industries. For instance, large firms in the information & communications industry derived 56 per cent of their operating receipts from e-commerce in 2018, significantly higher than the 21 per cent for small-to-medium-sized firms in the same industry. Notwithstanding this, the latter was still higher than the e-commerce revenue shares seen in most of the other services industries. A large gap can also be observed in the transportation & storage industry, where large firms derived 17 per cent of their operating receipts from e-commerce as compared to 4.5 per cent for small-to-medium-sized firms. This likely reflects the significant value of flight tickets sold online by airlines, which tend to be large firms. By contrast, smaller firms in this industry are likely to be engaged in activities where e-commerce tends to be less prevalent, such as vehicle towing services.

Unlike these two industries, the e-commerce revenue share of large firms in the accommodation industry was lower than that of small-to-medium-sized firms in the same industry, at 19 per cent and 28 per cent respectively in 2018. This can be attributed to larger hotels having more diverse distribution channels such as block contracts with corporates and travel agencies<sup>7</sup>, some of which may be non-e-commerce in nature.

Exhibit 3: E-commerce Revenue Share of Operating Receipts (OR) by Firm Size, 2018



Source: Department of Statistics

Note: E-commerce revenue share of operating receipts by firm size is not available for the food services and business services industries.

<sup>7</sup> A block contract is a contractual arrangement between hotels and companies, where hotels will reserve a fixed number of rooms at a negotiated rate.

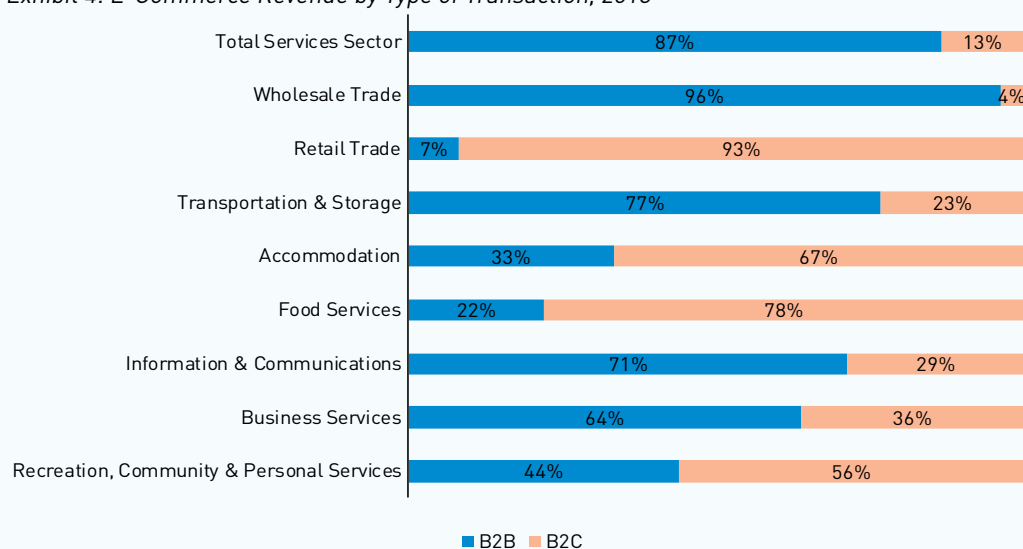


### Within the services sector, e-commerce revenue was mainly contributed by business-to-business transactions...

Finally, we look at the type of e-commerce transactions within each industry, i.e., whether the e-commerce revenue was generated from trading with other firms (B2B) or with end consumers (B2C).

In 2018, 87 per cent of the \$237 billion in e-commerce revenue in the services sector was contributed by B2B transactions [Exhibit 4], with B2C transactions accounting for the remaining 13 per cent. Within the sector, B2B transactions accounted for the bulk of e-commerce revenue in industries like wholesale trade, transportation & storage, and information & communications. On the other hand, consumer-facing industries such as retail trade, food services, accommodation, and recreation, community & personal services generated most of their e-commerce revenue from B2C transactions.

Exhibit 4: E-Commerce Revenue by Type of Transaction, 2018



Source: Department of Statistics

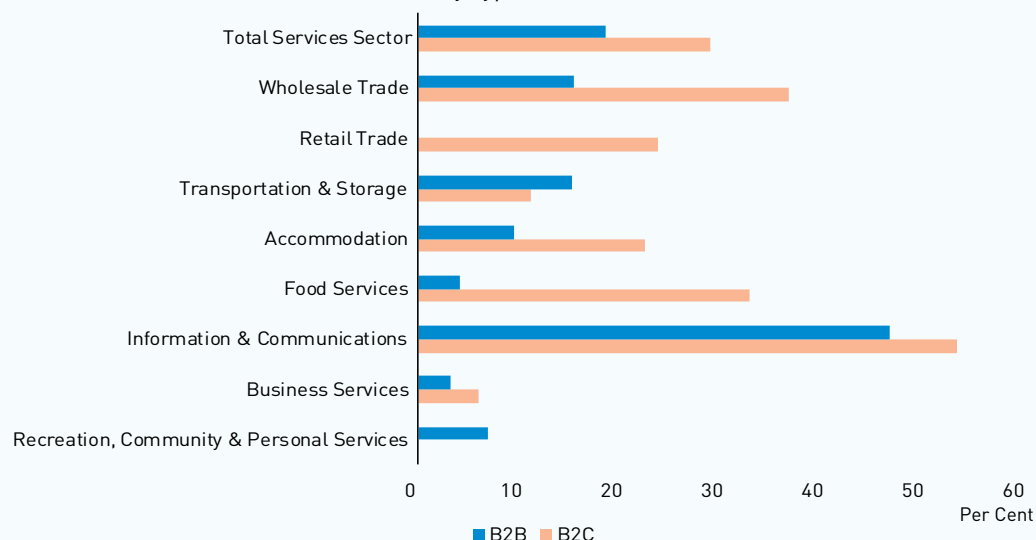
### ...although e-commerce revenue from B2C transactions grew faster than that from B2B transactions

Between 2016 and 2018, B2C e-commerce revenue in the services sector grew by 29 per cent on a CAGR basis, faster than the 19 per cent CAGR increase for B2B e-commerce revenue [Exhibit 5]. This pattern was observed in most of the industries within the sector, including both B2B-centric industries such as wholesale trade and B2C-centric industries such as accommodation, retail trade and food services.

There are several possible reasons for the faster growth in B2C e-commerce revenue compared to B2B e-commerce revenue, apart from base effects. First, B2C e-commerce has become more widely adopted and accepted by consumers in recent years<sup>8</sup>, fueled by increased smartphone usage among the general population. Second, a study<sup>9</sup> by McKinsey has found that digitalisation in B2B firms generally lagged that in B2C firms as procurement activities associated with B2B transactions tend to be more complex. The latter can in turn be attributed to factors such as more decision-makers being involved in the final purchasing decision, higher price points and a more complicated array of products and specifications.

<sup>8</sup> Based on the Household Expenditure Survey conducted by DOS, 60% of households reported online purchases in 2017/18, up from 31% in 2012/13.

<sup>9</sup> Harrizon, L., Plotkin, C., Stanley, J. (2017). Measuring B2B's Digital Gap. McKinsey Quarterly, January 2017.

*Exhibit 5: CAGR of E-commerce Revenue by Type of Transaction, 2016 – 2018*

Source: Department of Statistics

## Conclusion

With digital transformation being a key strategy in Singapore's economic development, e-commerce is poised to be an increasingly important channel that services firms can leverage to expand their market reach, raise productivity and explore new business ideas. While most of the industries in the services sector have seen an increase in e-commerce adoption, there is scope for firms across all industries to do more. The Government is committed to supporting firms in this journey. For instance, the SMEs Go Digital programme offers pre-approved digital solutions to small- and medium-sized enterprises (SMEs) in areas such as e-commerce. Through this and other initiatives, the Government will help firms in their transformation efforts and enable them to take advantage of the vast opportunities that come from digitalisation.

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# CHAPTER 7

# **ECONOMIC OUTLOOK**





# CHAPTER 7

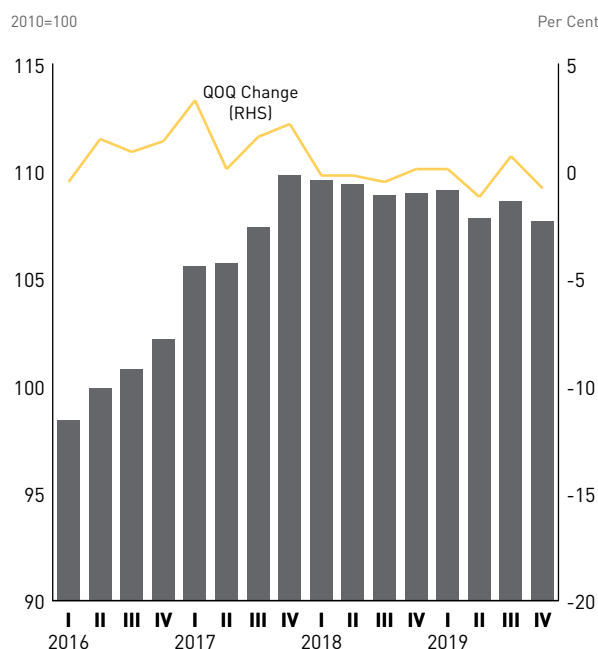
# ECONOMIC OUTLOOK

## LEADING INDICATORS

The composite leading index (CLI) points to a weaker outlook for the Singapore economy in the near term. Specifically, the CLI declined by 0.8 per cent on a quarter-on-quarter basis in the fourth quarter of 2019, reversing the 0.7 per cent increase in the third quarter (Exhibit 7.1).

Of the nine components in the CLI, three of them rose on a quarter-on-quarter basis, namely non-oil sea cargo handled, money supply and new companies formed. By contrast, stock price, domestic liquidity, non-oil retained imports, wholesale trade, stock of finished goods and the US Purchasing Managers' Index fell compared to a quarter ago.

*Exhibit 7.1: Composite Leading Index Levels and Growth Rate*



## OUTLOOK FOR 2020

In November 2019, MTI announced a GDP growth forecast of "0.5 to 2.5 per cent" for 2020. The forecast was premised on a modest pickup in global growth, along with a recovery in the global electronics cycle, in 2020. Since then, the outbreak of the coronavirus disease 2019 (COVID-19) has affected China, Singapore and many countries around the world.

In Asia, the COVID-19 outbreak is likely to dampen the growth prospects of China and other affected countries this year. In China, GDP growth in 2020 is expected to come in lower than earlier projected due to a pullback in household consumption as a result of the lockdowns and travel restrictions implemented in several major Chinese cities to contain the spread of the virus. Industrial production has also been disrupted because of work stoppages and delays arising from these containment measures. These developments in China will, in turn, have a knock-on impact on regional economies, including the ASEAN economies, through lower outbound tourism and other import demand from China, as well as disruptions to supply chains. Regional economies directly affected by the COVID-19 outbreak, such as Japan, Thailand and Malaysia, may also experience a drop in domestic consumer sentiments, and hence private consumption growth.

Elsewhere, the growth outlook for the US and Eurozone economies in 2020 remains broadly unchanged. In the US, GDP growth is expected to moderate this year, as the impact of the 2018 tax cuts wanes and trade policy uncertainty continues to weigh on private investment. Nevertheless, private consumption is likely to remain firm on the back of a healthy labour market and resilient wage growth. Growth in the Eurozone economy in 2020 is expected to be similar to last year's, as stable labour market conditions and favourable financing conditions are likely to lend support to domestic demand.



At the same time, uncertainties in the global economy remain. First, should the COVID-19 outbreak be more widespread, severe and protracted than anticipated, there could be a sharper pullback in global consumption, as well as more prolonged disruptions to global supply chains and production. A sharper-than-expected slowdown in the Chinese economy arising from the outbreak will also negatively affect global trade and economic growth. Second, notwithstanding the Phase 1 trade deal, US-China trade relations remain uncertain, especially as they turn to more contentious issues in the next phase of their negotiations. Third, geopolitical tensions in the Middle East could affect financial and commodity markets, which will have negative spillover effects on the region and Singapore.

Against this backdrop, the outlook for the Singapore economy has weakened since the last review in November. In particular, the COVID-19 outbreak is expected to affect the Singapore economy through several channels. First, outward-oriented sectors such as manufacturing and wholesale trade will be affected by the weaker growth outlook in several of Singapore's key final demand markets, including China. Firms in these sectors could also be affected by supply chain disruptions arising from prolonged factory closures and labour shortages in China as a result of the measures implemented by the Chinese government to contain the outbreak.

Second, the outbreak has led to a sharp fall in tourist arrivals, particularly from China, to Singapore. This has badly affected the tourism (e.g., hotels, travel agents and cruise operators) and transport (e.g., air transport) sectors. Third, domestic consumption in Singapore is likely to decline as locals cut back on shopping and dining-out activities. This will adversely affect firms in segments such as retail and food services.

Nonetheless, there are pockets of relative strength in the Singapore economy. These include the construction sector, which is projected to post steady growth given the rebound in construction demand since 2018. The information & communications sector is also expected to be resilient on account of sustained enterprise demand for IT solutions.

Taking into account the global and domestic economic environment, the GDP growth forecast for 2020 is downgraded to **"-0.5 to 1.5 per cent", with growth expected to come in at around 0.5 per cent**, the mid-point of the forecast range. As the COVID-19 situation is still evolving, MTI will continue to monitor developments and their impact on the Singapore economy closely.





# FEATURE ARTICLE







## FEATURE ARTICLE

# INNOVATION SPACE AND THE CUMULATIVE NATURE OF TECHNOLOGICAL PROGRESS:

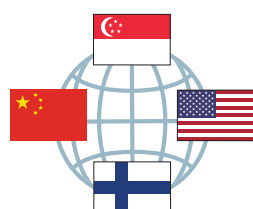
## A Case Study of Singapore

### INTRODUCTION

Knowledge of their existing technological strengths and the adjacent technological areas that can leverage these strengths is important for economies seeking to upgrade their innovation capabilities. To enhance understanding in this area, a diagnostic tool called the “Innovation Space” was created to (i) analyse the technological capabilities of economies over time, (ii) benchmark the technological capabilities of economies against one another, (iii) assess economies’ ability to build new technological capabilities based on their existing technological strengths, and (iv) identify opportunities for innovation collaborations between countries.



**ANALYSE THE TECHNOLOGICAL CAPABILITIES OF ECONOMIES OVER TIME**



**BENCHMARK THE TECHNOLOGICAL CAPABILITIES OF ECONOMIES AGAINST ONE ANOTHER**



**ASSESS ECONOMIES' ABILITY TO BUILD NEW TECHNOLOGICAL CAPABILITIES BASED ON THEIR EXISTING TECHNOLOGICAL STRENGTHS**



**IDENTIFY OPPORTUNITIES FOR INNOVATION COLLABORATIONS BETWEEN COUNTRIES**

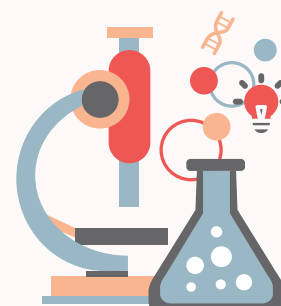
### SINGAPORE'S INNOVATION LANDSCAPE



In Singapore's case, we find that its areas of innovation through the years have complemented its economic needs and productive capabilities. Reflecting its progress in developing technological capabilities, Singapore has seen healthy growth in its patenting activity and forged stronger international innovation collaborations over the past decade. Its patents also generally have higher technological influence and are advancing from more recent technology.

### CONCLUSION

Singapore's Research, Innovation and Enterprise plans and Industry Transformation Maps play important roles in deepening the linkages in its innovation ecosystem, strengthening the research-industry nexus, and growing its indigenous innovation capabilities. Such efforts will build on Singapore's existing competitive strengths and help to drive its progress towards a knowledge-based, innovation-driven and value-creating economy.



## EXECUTIVE SUMMARY

- ▶ Knowledge of their existing technological strengths and the adjacent technological areas that can leverage these strengths is important for economies seeking to upgrade their innovation capabilities. To enhance understanding in this area, we create a diagnostic tool called the “Innovation Space” to (i) analyse the technological capabilities of economies over time, (ii) benchmark the technological capabilities of economies against one another, (iii) assess economies’ ability to build new technological capabilities based on their existing technological strengths, and (iv) identify opportunities for innovation collaborations between countries.
- ▶ In Singapore’s case, we find that its areas of innovation through the years have complemented its economic needs and productive capabilities. Reflecting its progress in developing technological capabilities, Singapore has seen healthy growth in its patenting activity and forged stronger international innovation collaborations over the past decade. Its patents also generally have higher technological influence and are advancing from more recent technology.
- ▶ Singapore’s Research, Innovation and Enterprise plans and Industry Transformation Maps play important roles in deepening the linkages in its innovation ecosystem, strengthening the research-industry nexus, and growing its indigenous innovation capabilities. In the area of intellectual property (IP), Singapore’s continued investments in patent analytics and tech forecasting capabilities will help to sharpen national research and development (R&D) and innovation decisions. The strengthening of IP management capabilities will also facilitate the translation of public-funded R&D into economic and societal outcomes. Such efforts will build on Singapore’s existing competitive strengths and help to drive its progress towards a knowledge-based, innovation-driven and value-creating economy.

*The views expressed in this paper are solely those of the authors and do not necessarily reflect those of the Ministry of Trade and Industry (MTI), Agency for Science, Technology and Research (A\*STAR), National Research Foundation (NRF), Intellectual Property Office of Singapore (IPOS) or the Government of Singapore.<sup>1</sup>*

## 1. INTRODUCTION

A country’s economic competitiveness is driven and enabled by its productive capabilities, which include physical and institutional infrastructure, production capacity, as well as production, organisational, technological and innovation capabilities (see Andreoni et al., 2015). For advanced economies, building up innovation capabilities is important as such capabilities play a key role in pushing the technological frontiers, thereby helping the economies to sustain their long-term competitive advantage and economic growth.

Innovation is a cumulative process where history and the existing stock of knowledge are important in shaping future innovations (Furman & Stern, 2011; Lazonick & Mazzucato, 2013; Acemoglu et al., 2016). Path dependence in the development of technology means that the direction of innovation is shaped by past successes and failures (Rosenberg, 1976). By fostering a conducive ecosystem where innovators build on existing successful ideas and knowledge to develop new innovations, economies can better create a self-sustaining virtuous cycle of innovation.

<sup>1</sup> We would like to thank Ms Yong Yik Wei, A\*STAR, NRF, IPOS, and the Economic Development Board for their useful suggestions and comments.

Knowledge of their existing technological strengths and the adjacent technological areas that can leverage these strengths is important for economies seeking to upgrade their innovation capabilities. To enhance understanding in this area, we create a diagnostic tool called the “Innovation Space” to (i) analyse the technological capabilities of economies over time, (ii) benchmark the technological capabilities of economies against one another, (iii) assess economies’ ability to build new technological capabilities based on their existing technological strengths, and (iv) identify opportunities for innovation collaborations between countries. In this article, we focus on the case study of Singapore.

The rest of the paper is organised as follows. Section 2 reviews the relevant literature that motivates this study. Section 3 describes the data source and methodology used to construct the Innovation Space. Section 4 presents Singapore’s innovation landscape, while Section 5 applies the Innovation Space to Singapore’s context. The final section concludes.

## 2. LITERATURE REVIEW

An economy’s existing capabilities serve as a foundation for it to build new capabilities. Leveraging data on countries’ exports, Hidalgo et al. (2007) pioneered the use of product space maps to cluster products with similar capabilities.<sup>2</sup> In a product space map, product relatedness was based on an output-based proximity measure where two products were in close proximity if they had a high probability of being jointly exported by countries with comparative advantages in both of them (for more details, see Hausmann & Klinger, 2006, 2007). In a similar vein, Zaccaria et al.’s (2014) taxonomy network highlighted that countries followed a sequential and systematic process of industrial upgrading, as they transformed their capabilities from “root” to new products. Collectively, this body of research suggests that complementary capabilities serve as the basis to develop adjacent industrial strengths (Hidalgo, 2018), and that structural change in an economy typically follows a diffusion process over a network of products (Hidalgo & Hausmann, 2008).

Similarly, technological and scientific progress is a cumulative process whereby new innovations build on the stock of past and existing knowledge. Analysing 1.8 million United States patents between 1975 and 1994, Acemoglu et al. (2016) created an “Innovation Network” that linked progress in technological fields to prior advances in upstream technological areas. The authors found that patenting in upstream technology fields had a strong predictive power on subsequent downstream innovations over the next decade. This would suggest that prior knowledge in adjacent or related fields serves as a base to build new technological strengths.

## 3. DATA AND METHODOLOGY

This study focuses on the early stage of the innovation process – inventiveness, as measured by patents.<sup>3</sup> Patents provide ex-ante incentives to innovate by (i) rewarding innovators with ex-post profits for successful innovations, and (ii) excluding imitators for a finite period of time.<sup>4</sup> The mandatory disclosure of the invention in a patent in exchange for legal protection has made the patent system one of the most effective tools for knowledge sharing and technology transfer.<sup>5</sup> At a country level, the quantity and quality of patents generated are widely acknowledged to be important drivers of economic growth and development (see Lee & Kim, 2009; Hasan & Tucci, 2010).

Our analyses of patents leverage PATSTAT, a global patent statistical database that contains bibliographical intellectual property (IP) rights data relating to more than 100 million patent documents from over 190 patent offices<sup>6</sup> in the world for the period of 1977 to 2016<sup>7</sup>. Bibliographical information on patent applications in the PATSTAT database includes citations to prior art (i.e., published patents that precede and are referenced by the current application) and the International Patent Classification (IPC) of the patent.

<sup>2</sup> See Hausmann et al. (2013) for a more recent formulation of product space maps.

<sup>3</sup> As this study focuses on the early stage of the innovation process using patents data, it does not cover innovation that arises from (i) the commercialisation of novel products, (ii) new business methods and processes, (iii) internet-based or software applications that are not patentable, (iv) open source innovation, and (v) inventions that are trade secrets. Nonetheless, as noted by Lee (2013), patents remain an appropriate indicator to capture the proprietary and competitive dimensions of technological change, as they are direct outcomes of the inventive process (specifically inventions which are expected to have a commercial impact).

<sup>4</sup> Patents mitigate the fundamental problem of appropriability, which is a concern for inventors as knowledge – an output of the innovation process – is an intangible asset and public good. Patents are also an important part of a firm’s innovation strategy because they can be used (i) to obtain licensing revenue, (ii) as bargaining chips in negotiations, and/or (iii) as a defensive strategy to prevent lawsuits.

<sup>5</sup> Based on a survey by the Organisation for Economic Co-operation and Development, 88 per cent of firms from the United States, Europe and Japan reported that the information disclosed in patents was useful in shaping and implementing their research & development (R&D) strategy (Lévêque & Ménérier, 2006).

<sup>6</sup> They include the five largest patent offices in the world – i.e., the United States Patent and Trademark Office (USPTO), European Patent Office (EPO), China National Intellectual Property Administration (CNIPA), Japan Patent Office (JPO) and Korean Intellectual Property Office (KIPO).

<sup>7</sup> More recent data were excluded from the analysis as the study focuses on published patents, which typically have a lag of 18 months from the date of filing.



We examine patents at the family-level where identical patents that are filed in different patent offices are grouped together. We focus on published patents<sup>8</sup>, with the earliest filing year of the patents in a patent family chosen as the reference year as it is closest to the date of invention (see OECD, 2009). The inventor's country of residence is used as the reference country of the patent, rather than where the patent is filed or the inventor's nationality. In instances where a patent family has multiple inventors from different countries of residences, it will be counted separately for each country.<sup>9</sup>

In order to map the patents into technology fields, we utilise the IPC<sup>10</sup> of the patent, which classifies patents according to their technical function and field of application. Specifically, the IPCs are aggregated into 35 technology fields using an IPC-Technology concordance table [Exhibit 1].<sup>11</sup> As a patent may be associated with multiple IPCs, we follow Jaffe's (1986) approach to apportion the patent based on the IPC weight to avoid over counting.<sup>12</sup>

Exhibit 1: List of 35 IPC Technology Fields

Electrical Engineering	Chemistry	Mechanical Engineering
1. Electrical machinery, apparatus, energy	14. Organic fine chemistry	25. Handling
2. Audio-visual technology	15. Biotechnology	26. Machine tools
3. Telecommunications	16. Pharmaceuticals	27. Engines, pumps, turbines
4. Digital communication	17. Macromolecular chemistry, polymers	28. Textile and paper machines
5. Basic communication processes	18. Food chemistry	29. Other special machines
6. Computer technology	19. Basic materials chemistry	30. Thermal processes and apparatus
7. IT methods for management		31. Mechanical elements
8. Semiconductors		32. Transport
Instruments	Other Fields	
9. Optics	33. Furniture, games	
10. Measurement	34. Other consumer goods	
11. Analysis of biological materials	35. Civil engineering	
12. Control		
13. Medical technology		

Source: Schmoch (2008)

To investigate connections between patents (and the technologies embedded within them), we focus on citations to prior art which are identified by the applicant or patent examiner. Patent citations can be backward (i.e., citations to previous patent documents) or forward (i.e., citations subsequently received by the patent), and are commonly used to measure knowledge flows (Jaffe et al., 1993, 2000), patent quality (Harhoff et al., 2003), and companies' strategic behaviour (Podolny et al., 1996).

Finally, to create the Innovation Space, we adopt and expand the approach that Acemoglu et al. (2016) used to construct their Innovation Network. First, we create a Global Innovation Network based on patent citations between 2007 and 2016, which reflect the Science and Technology (S&T) precedents in inventions, and the knowledge diffusion between different technology fields. To establish linkages between technology fields in the network, we compute a CiteFlow indicator using patent citations:

$$CiteFlow_{j \rightarrow k} = \frac{Citation_{j \rightarrow k}}{Citation_j}$$

<sup>8</sup> Published patents include patents that are eventually rejected for the certificate of grant. Patents that are filed but not yet published are excluded from the analysis. Patents are typically published within 18 months after filing, unless they are withdrawn before publication.

<sup>9</sup> For instance, a patent family with five inventors (three residing in Germany, one in China and one in Singapore) will count as one observation in each of the three countries.

<sup>10</sup> The IPC is an internationally-recognised, hierarchical patent classification system that is administered by the World Intellectual Property Organisation (WIPO).

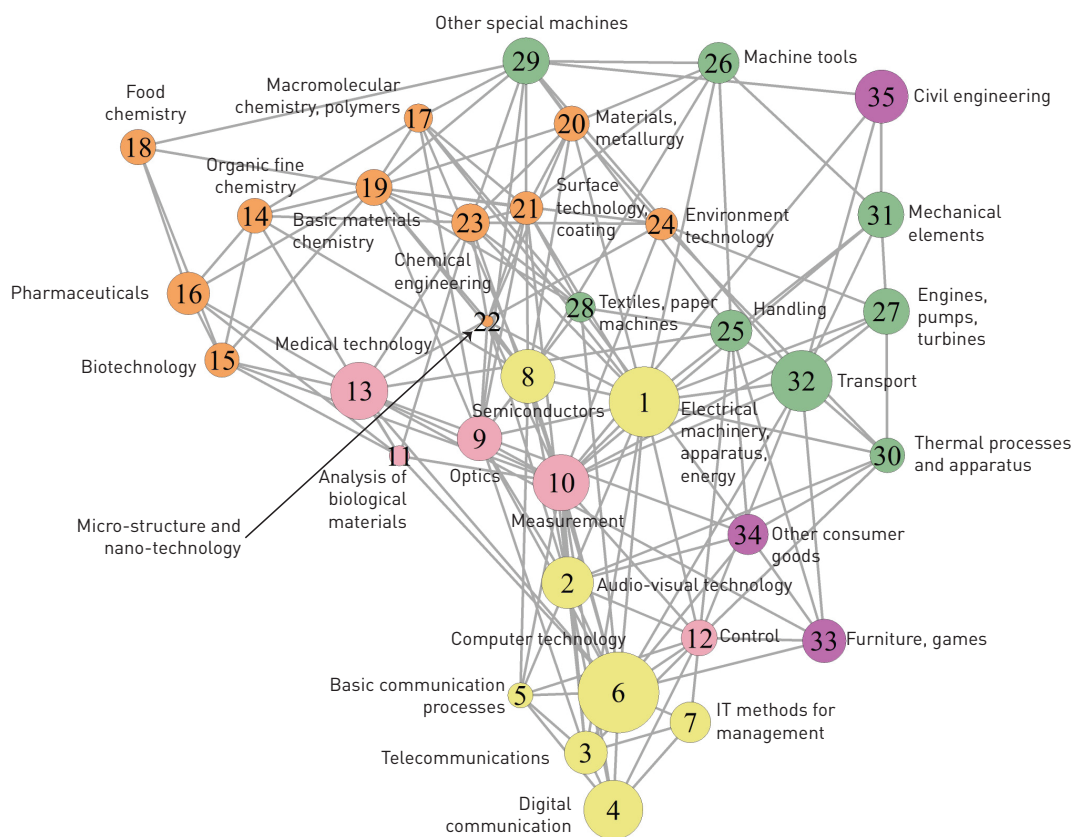
<sup>11</sup> The IPC classes are mapped to technology areas using the IPC-Technology concordance table (see Schmoch, 2008).

<sup>12</sup> For instance, if a patent is associated with three IPCs under technology field A and two IPCs under technology field B, it will have a technology field weight of 0.6 in A and 0.4 in B.

where  $CiteFlow_{j \rightarrow k}$  is a 35x35 matrix that quantifies the rate at which patents in technology  $k$  cite patents in technology  $j$ . This indicator thus represents the flow of knowledge from prior technology  $j$  to technology  $k$ . We consider two technology fields to be more closely related if patents in one technology field have a higher propensity to cite patents in the other technology field (i.e., high CiteFlow).

In the Global Innovation Network, each node represents an IPC technology field, with the edge between any pair of technology fields quantified by CiteFlow [Exhibit 2]. As such, the closer the nodes, the more closely related are the technology fields represented by the nodes. The size of each node in the network is proportional to the share of a technology field's patenting activity in the world (i.e., larger nodes indicate higher global patenting activity), and the colours correspond to the five broad technology areas (i.e., Electrical Engineering, Instruments, Chemistry, Mechanical Engineering, and Other Fields) in the IPC-Technology concordance table.

Exhibit 2: Global Innovation Network, 2007-2016



Notes: The network is a directed graph, but has been plotted without arrows here. The nodes are positioned based on the best two-dimensional representation of the network.

Source: Authors' estimates

Second, we compute a country's Revealed Technological Advantage (RTA) to reflect the relative specialisation of the country in different technology fields:

$$RTA_{i,j,t} = \frac{P_{i,j,t}}{P_{world,j,t}} \bigg/ \frac{\sum_j P_{i,j,t}}{\sum_j P_{world,j,t}}$$

where  $P_{i,j,t}$  refers to the number of patents by country  $i$  in technology field  $j$  at time  $t$ . Broadly, RTA is computed as an economy's share of patents in a particular technology field in the world divided by its share of patents in the world across all technology fields.<sup>13</sup> The RTA is greater than one for technology fields that the economy is relatively more specialised in (i.e., it has relatively stronger capabilities in these technology fields). Conversely, RTA is less than or equal to one when the economy does not specialise in the technology field.

Third, we combine the Global Innovation Network (which maps the relationships between technology fields) and the RTA scores achieved by a country for each of the technology fields to construct the Innovation Space for that country. Specifically, RTA is used in the Innovation Space to identify the country's current technological strengths and capabilities (i.e., nodes with  $RTA > 1$  are shaded as red, while  $RTA \leq 1$  are shaded as blue).

The Innovation Space builds on Acemoglu et al.'s (2016) innovation Network in three ways. First, the analysis spans beyond patents in the United States to patents in the world. This is important as knowledge and the process of knowledge diffusion are not confined within the geographical boundaries of individual countries. Second, it layers on the RTA indicator to reflect a country's technological strengths, in order to better identify opportunities through adjacencies in technology fields. Third, it captures relationships between patents (and their embedded technologies) in the more recent decade (i.e., 2007 to 2016), whereas Acemoglu et al.'s (2016) Innovation Network only focused on the period up to 1994. This is pertinent as the nature of technological progress and new advances in various technology fields (e.g., digital technology) have led to changes in the location of and linkages between technology fields in the network over the years (see Annex A).

## 4. SINGAPORE'S INNOVATION LANDSCAPE

As an advanced economy that has benefitted from catch-up growth in its earlier years, innovation will play an increasingly important role in Singapore's next phase of economic development.<sup>14</sup> Recognising the importance of innovation in sustaining Singapore's competitive edge and economic growth, Singapore's government has made significant investments in research and development (R&D) through its various S&T and Research, Innovation and Enterprise (RIE) plans (Teo et al., 2019).

In this section, we describe the trends in Singapore's patenting activities vis-à-vis other economies to have a sense of the progress made in Singapore's innovation landscape, before presenting Singapore's Innovation Space in the next section. We make five key observations.

First, there are signs that Singapore's efforts in R&D are bearing fruit. Between the periods of 2007-2011 and 2012-2016, Singapore's patenting activity (i.e., the number of patent families published per million of total population) increased by 12.8 per cent, faster than that of the G3 economies (i.e., United States, Eurozone and Japan) and other East Asian economies (e.g., South Korea and Taiwan) [Exhibit 3].<sup>15</sup> Nonetheless, in absolute levels, Singapore's patenting activity in 2012-2016 remained below that of South Korea, Taiwan, Japan and the United States – economies with a longer history of innovation, suggesting that there is still room for Singapore to further raise its innovation capabilities.

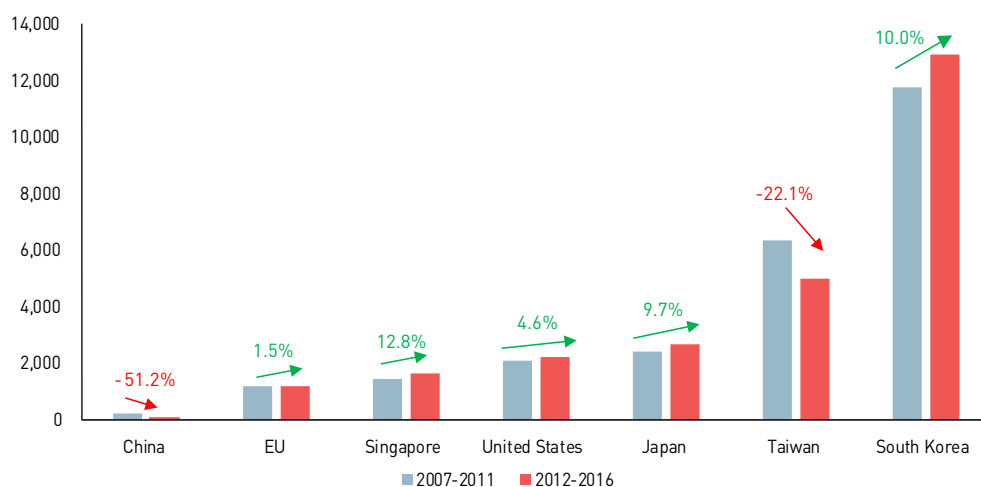
13 The RTA is analytically equivalent to Balassa's (1965) revealed comparative advantage (RCA) indicator in international trade, which uses the exports of products/services instead of patents in technology fields.

14 According to the Global Innovation Index 2019 by Cornell University, INSEAD and WIPO, Singapore ranked eighth in the world and first in Asia (Dutta et al., 2019).

15 The growth in Singapore's patenting activity between the periods of 2007-2011 and 2012-2016 also compares favourably with that of other small advanced economies such as Israel (4.9 per cent), Switzerland (1.8 per cent) and Sweden (1.6 per cent).

Exhibit 3: Patenting Activity, 2007-2016

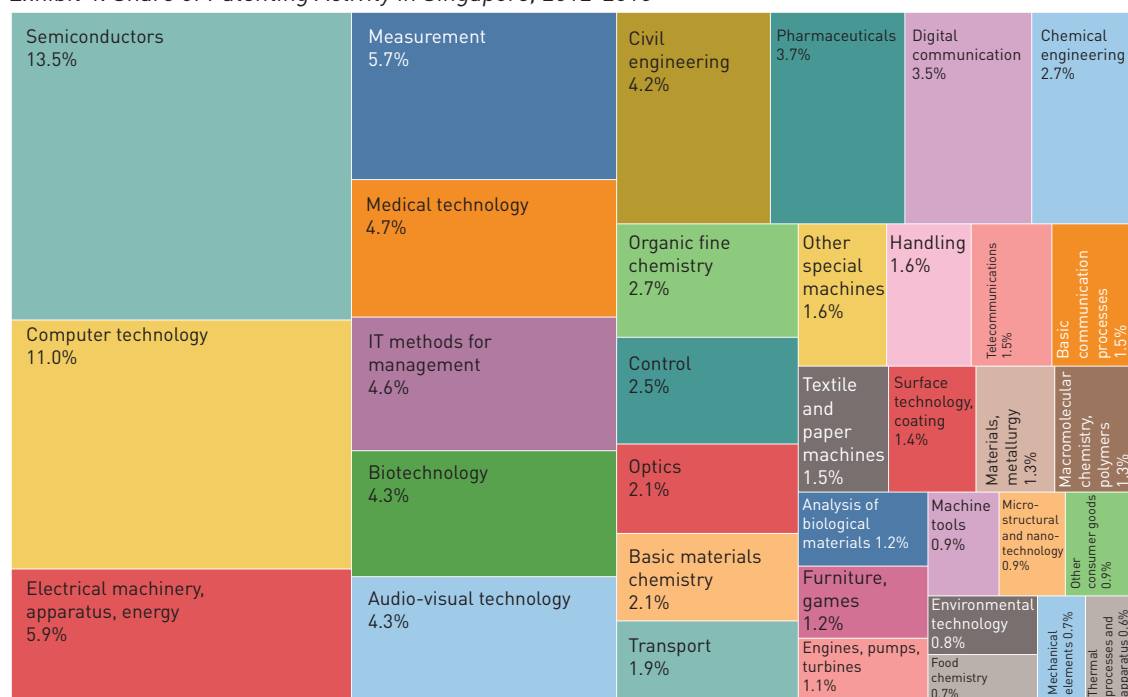
Number of Patent Families Published (per million of total population)



Source: PATSTAT, Authors' estimates

Second, Singapore's patenting activities have been in line with its capabilities in the manufacturing sector. In particular, given Singapore's strengths in the electronics industry, Singapore's patenting activities are tilted towards the technology fields of Semiconductors and Computer Technology [Exhibit 4]. This differs from global norms where patents are more evenly distributed across technology fields [Exhibit 5]. Based on Singapore's RTA Index for the period of 2012-2016, its relative technological strengths were mainly in the Electrical Engineering, Instruments and Chemistry areas, particularly Micro-structure and Nano-technology<sup>16</sup>, Semiconductors, and Biotechnology [Exhibit 6].

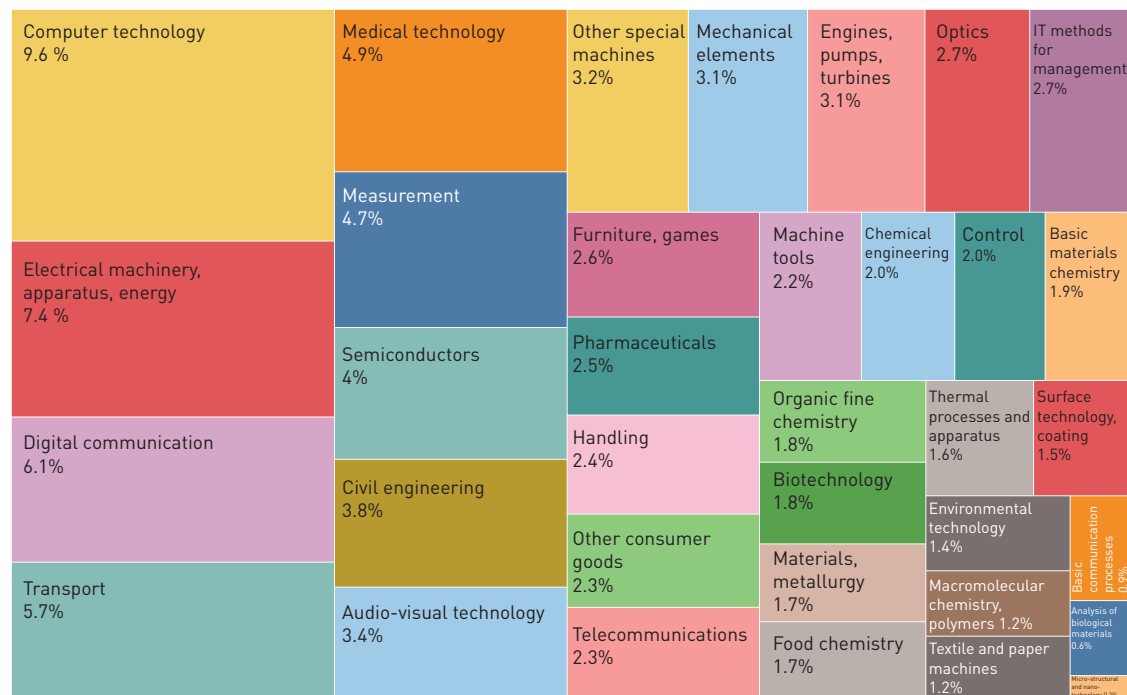
Exhibit 4: Share of Patenting Activity in Singapore, 2012-2016



Source: PATSTAT, Authors' estimates

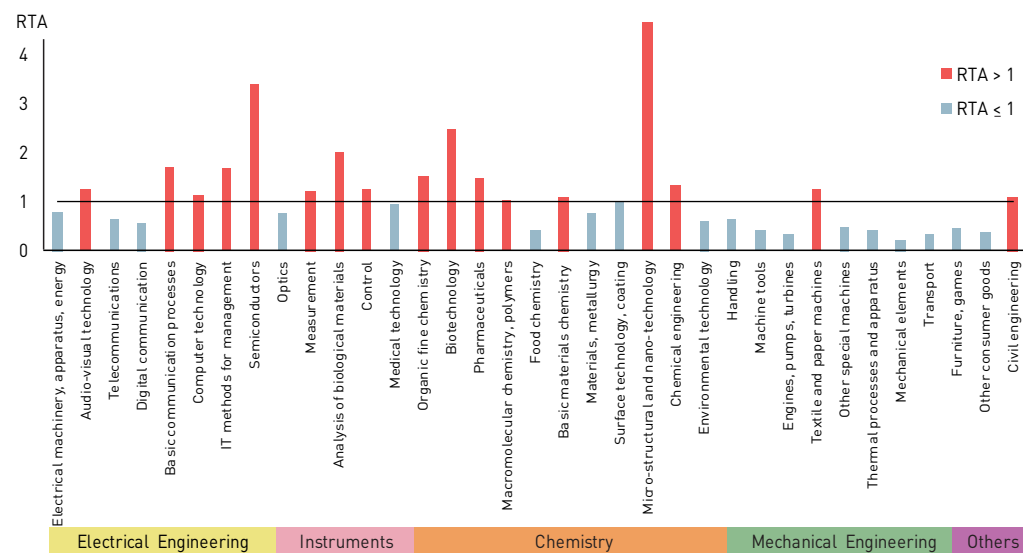
<sup>16</sup> Reflecting Singapore's strength in micro-structure and nano-technology, the Nanyang Technology University of Singapore ranks highly in the world for Material Science. It is ranked first in the U.S. News (2019) Best Universities Rankings 2019, and third in the 2019 Quacquarelli Symonds (2019) World University Rankings, behind the Massachusetts Institute of Technology and Stanford University, but above the University of Cambridge and Harvard University. See Boey (2016) and Venkatraman (2016) for more information on Singapore's developments in material sciences.

Exhibit 5: Share of Patenting Activity in the World, 2012-2016



Source: PATSTAT, Authors' estimates

Exhibit 6: Singapore's RTA Index, 2012-2016



Source: Authors' estimates

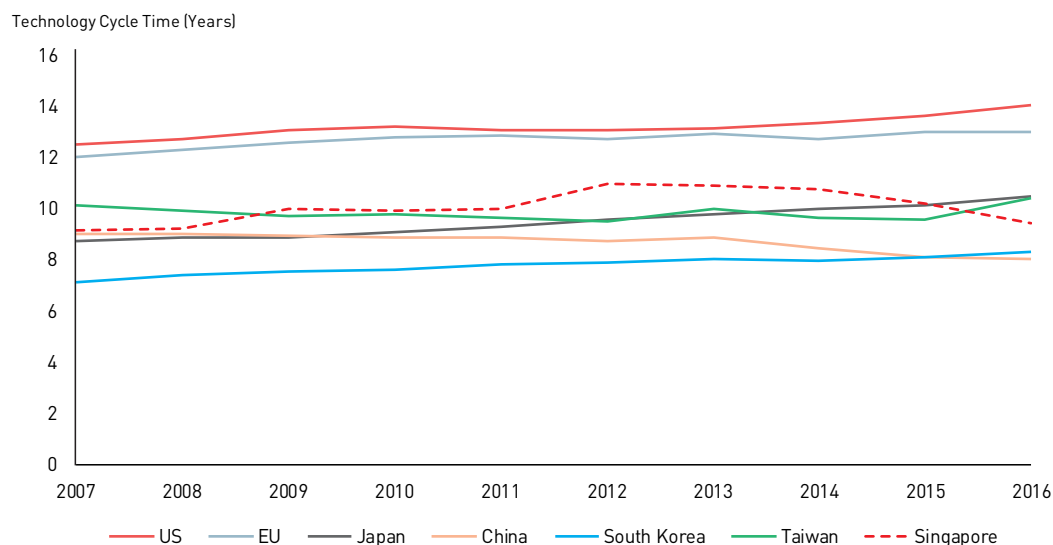
Third, Singapore's speed of innovation, as measured by technology cycle time<sup>17</sup> [i.e., the average age of patents that a country's patents cite], is faster than that in the United States and European Union [Exhibit 7]. This is partly driven by Singapore's heavier focus in technology fields with shorter industry cycles (e.g., Semiconductors and Computer Technology).<sup>18</sup> Over the more recent period of 2012-2016, Singapore's technology cycle time has shortened further, indicating that its patents are increasingly advancing from more recent technology.

<sup>17</sup> See Hall et al. (2002) for more details on technology cycle times.

<sup>18</sup> Globally, the technology cycle times of Semiconductors (7.75 years) and Computer Technology (8.46 years) were faster compared to the average technology cycle time across the 35 IPCs (12.61 years) between 2007 and 2016. In Singapore, the technology cycle times of Semiconductors (7.48 years) and Computer Technology (7.54 years) were faster compared to global levels.



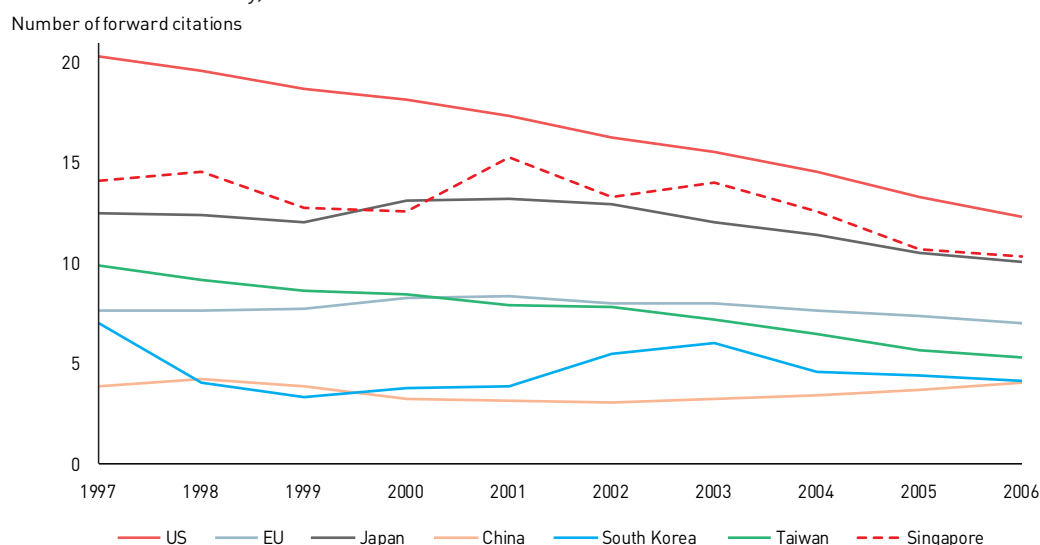
*Exhibit 7: Technology Cycle Time, 2007-2016*



Source: Authors' estimates

Fourth, reflecting high patent quality and technological influence, Singapore's patents are generally well-cited by other patents (i.e., high forward citation counts) [Exhibit 8].<sup>19</sup> Notably, Singapore's patent quality is better than South Korea's and Taiwan's, with its leading position largely due to innovations in its core areas of expertise such as Semiconductors.<sup>20</sup>

*Exhibit 8: Patent Quality, 1997-2006*



Note: The analysis was for the period 1997-2006 as forward citations were counted over a period of ten years after the publication date (i.e., 2007-2016).

Source: Authors' estimates

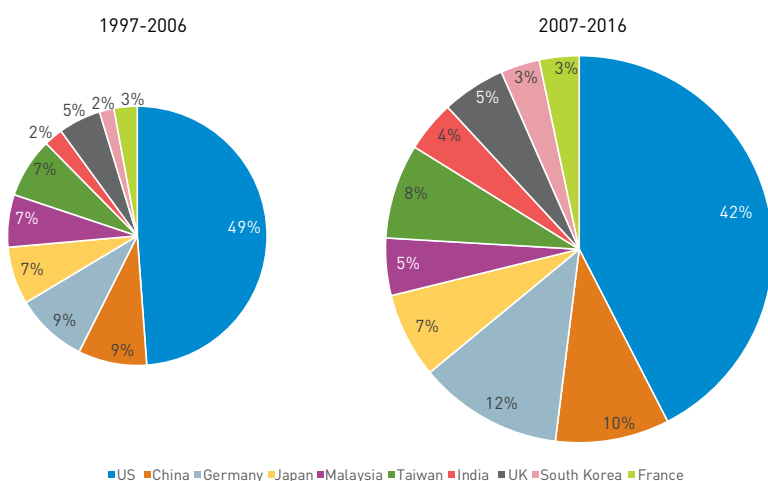
Fifth, Singapore-based inventors have also made progress in international innovation collaboration efforts, with the number of patents with at least one foreign-based inventor more than doubling between 1997-2006 and 2007-2016 [Exhibit 9]. While the United States remained a key innovation partner, Singapore-based inventors had entered into more partnerships with inventors in China and Germany in the period of 2007-2016 compared to the earlier period of 1997-2006. These partnerships were mainly in the area of Semiconductors.

<sup>19</sup> Patent quality is measured by the number of forward citations over ten years. Forward citations serve as a proxy of technological impact, as a revolutionary patent with greater technological influence attracts more citations (see Trajtenberg, 1990; Harhoff et al., 2003; Lanjouw & Schankerman, 2004).

<sup>20</sup> Notably, Singapore's average ten-year forward citation counts for the period of 1997-2006 for Semiconductors was 16.67, significantly higher than the global average for patents in the same field (9.94).

*Exhibit 9: Collaborations of Singapore-based Inventors, 1997-2016*

Share of Singapore-based patents published with at least one foreign-based inventor

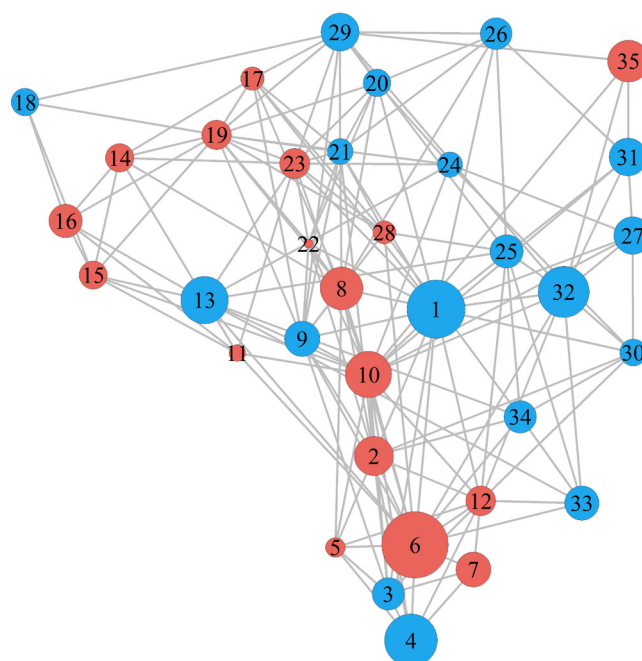


Source: Authors' estimates

## 5. INNOVATION SPACE – A CASE STUDY OF SINGAPORE

We next present the Innovation Space for Singapore, trace its evolution over time, and highlight possible policy takeaways.

Singapore's Innovation Space for the most recent period of 2012-2016 is shown in Exhibit 10. From the Innovation Space, we can observe that Singapore's technological strengths are largely clustered in the areas of Electrical Engineering, Chemistry and Instruments (see red nodes in Exhibit 10 that denote technology fields that have RTA > 1), which are in line with Singapore's industrial development and economic priorities.

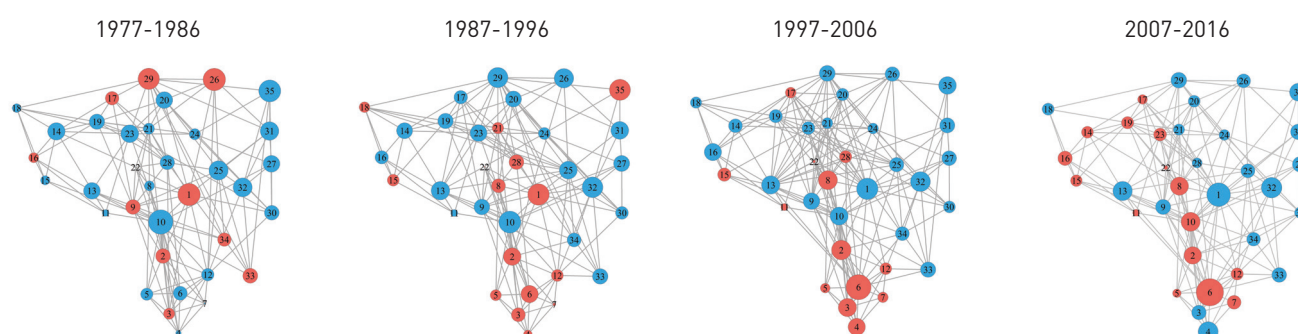
*Exhibit 10: Singapore's Innovation Space, 2012-2016*

Note: Red nodes denote technology fields that Singapore has a revealed technological advantage in (i.e., RTA > 1).

Source: Authors' estimates

The development of Singapore's technological capabilities over time has, in fact, always been closely aligned with its economic priorities and industrial development strategies. To see this, we trace the evolution of Singapore's Innovation Space from 1977 to 2016 [Exhibit 11]. In its early phase of development (1977-1986), Singapore's technological capabilities were largely diffused, and included peripheral areas such as Furniture and Games (#33) and Other Consumer Goods (#34). As Singapore industrialised (1987-1996), it gained technological capabilities in new areas relating to the electronics industry, including Computer Technology (#6) and Semiconductors (#8). Between 1997 and 2006, Singapore consolidated its strengths in the electrical engineering cluster (#1-8), but also branched into Macromolecular Chemistry, Polymers (#17), supported by the opening of Jurong Island in 2000. With the growth of the chemicals and biomedical manufacturing clusters between 2007 and 2016, Singapore gained technological capabilities in Organic Fine Chemistry (#14), Pharmaceuticals (#16), Basic Materials Chemistry (#19) and Chemical Engineering (#23). The development of Singapore's information & communications sector also enabled it to nurture technological capabilities in Basic Communication Processes (#5) and IT Methods for Management (#7).

Exhibit 11: Evolution of Singapore's Innovation Space, 1977-2016



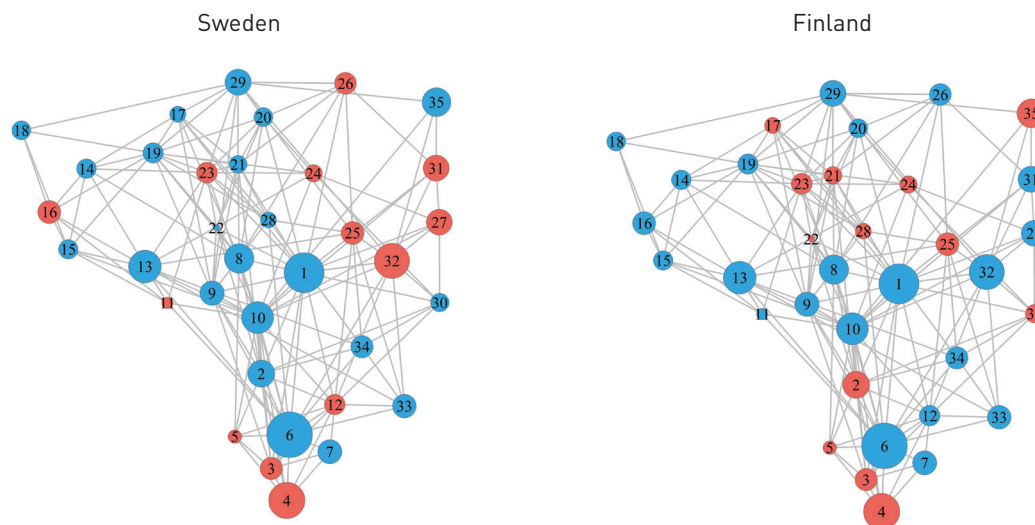
Note: The Innovation Space maps are constructed using ten-year periods. Red nodes denote technology fields that Singapore has a revealed technological advantage in (i.e., RTA > 1) for the period of analysis. The visualisations across the years use the 2007-2016 Global Innovation Network as the base network, with adjustments to the size of the node to reflect the technology field's share of global patenting activity in the period.

Source: Authors' estimates

Apart from allowing policymakers to trace the evolution of Singapore's technological capabilities over time, the Innovation Space can also shed light on adjacent technology fields that can leverage Singapore's existing technological strengths. For instance, based on the latest Innovation Space (2012-2016) for Singapore, there may be scope for Singapore to consider building capabilities in technology fields such as Medical Technology (#13), which is closely related to Analysis of Biological Materials (#11) and Biotechnology (#15), where Singapore's RTA is already above one.<sup>21</sup>

By comparing Singapore's Innovation Space with that of other economies, we can also identify potential areas of collaboration with these economies. For example, from the Innovation Space of small advanced economies such as Sweden and Finland [Exhibit 12], we can see that both Sweden and Finland have strengths in Telecommunications (#3) and Digital Communication (#4). Partnerships with Sweden and Finland may thus be mutually beneficial, as Singapore's technological strengths in Computer Technology (#6) and IT Methods for Management (#7) are complementary to Sweden/Finland's strengths in the related Telecommunications (#3) and Digital Communication (#4) technology fields. (We also present the Innovation Space for large economies like the United States and China in Annex B.)

<sup>21</sup> Between the periods of 2007-2011 and 2012-2016, Singapore's patenting activity in Medical Technology rose by 19.8 per cent, higher than that for Taiwan (16.4 per cent), European Union (3.8 per cent) and United States (0.6 per cent). During this period, patenting activity in Medical Technology in South Korea and Japan also grew robustly, at 51.0 per cent and 47.6 per cent respectively.

*Exhibit 12: Innovation Space for Sweden and Finland, 2012-2016*

Source: Authors' estimates

## 6. CONCLUSION

Mission-oriented innovation policy plays a key role in advancing scientific discovery and transforming an economy's ability to create the next generation of products and services. To sustain a virtuous cycle of innovation, successful economies benefit from fostering a rich ecosystem that thrives on the accumulation of knowledge and synergies between related activities. In this regard, the Innovation Space provides a framework to analyse the innovation landscape, survey an economy's technological strengths and capabilities, and identify opportunities that leverage the economy's existing technological capabilities.

In Singapore's case, its areas of innovation have complemented its economic needs and productive capabilities, with strengths observed in technology fields that are related to the electronics, chemicals, biomedical manufacturing, and information & communications sectors. Reflecting its progress in developing technological capabilities, Singapore has seen healthy growth in its patenting activity and forged stronger international innovation collaborations over the past decade. Its patents also generally have higher technological influence (as measured by forward citations) and are advancing from more recent technology (as measured by its technology cycle time).

As an advanced economy that is approaching the technological frontiers in many sectors, Singapore will need to forge new paths of success by intensifying and diversifying its innovation capabilities. Against this backdrop, Singapore's RIE plans and Industry Transformation Maps will play important roles in deepening the linkages in its innovation ecosystem, strengthening the research-industry nexus, and growing its indigenous innovation capabilities. In the area of IP, Singapore's continued investments in patent analytics and tech forecasting capabilities will help to sharpen national R&D and innovation decisions. The strengthening of IP management capabilities will also facilitate the translation of public-funded R&D into economic and societal outcomes. Such efforts will build on Singapore's existing competitive strengths and help to drive its progress towards a knowledge-based, innovation-driven and value-creating economy.

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## REFERENCES

- Acemoglu, D., Ukcigit, U., & Kerr, W. R. (2016). Innovation Network. *Proceedings of the National Academy of Sciences*, 113(41), 11483-11488.
- Andreoni, A., Kuan, M. L., & Goya, D. (2015). *Industrial Capabilities Indicators. Enhancing the Quality of Industrial Policies (EQulP) Tool 9*. Vienna: United Nations Industrial Development Organisation.
- Balassa, B. (1965). Trade Liberalisation and "Revealed" Comparative Advantage. *The Manchester School*, 33(2), 99-123.
- Boey, F. (2016). Historical Narrative Early Beginnings to Present. In F. Boey, B. V. Chowdari, & S. S. Venkatraman (Eds.), *50 Years of Materials Science in Singapore* (pp. 1-20). Singapore: World Scientific.
- Dutta, S., Lanvin, B., & Wunsch-Vincent, S. (Eds.). (2019). *Global Innovation Index 2019: Creating Healthy Lives - The Future of Medical Innovation*. Geneva: Cornell University, INSEAD and World Intellectual Property Organisation.
- Furman, J. L., & Stern, S. (2011). Climbing Atop the Shoulders of Giants: The Impact of Institutions on Cumulative Research. *The American Economic Review*, 101(5), 1933-1963.
- Hall, B. H., Jaffe, A. B., & Trajtenberg, M. (2002). The NBER Patent-Citations Data File: Lessons, Insights, and Methodological Tools. In A. B. Jaffe, & M. Trajtenberg (Eds.), *Patents, Citations, and Innovations: A Window on the Knowledge Economy* (pp. 403-460). Cambridge, MA: The MIT Press.
- Harhoff, D., Scherer, F. M., & Vopel, K. (2003). Citations, Family Size, Opposition and the Value of Patent Rights. *Research Policy*, 32(8), 1343-1363.
- Hasan, I., & Tucci, C. L. (2010). The Innovation-Economic Growth Nexus: Global Evidence. *Research Policy*, 39(10), 1264-1276.
- Hausmann, R., & Klinger, B. (2006). *Structural Transformation and Patterns of Comparative Advantage in the Product Space*. Center for International Development (Harvard University) Working Paper No. 128. Cambridge, MA: Harvard University.
- Hausmann, R., & Klinger, B. (2007). *The Structure of the Product Space and the Evolution of Comparative Advantage*. Center for International Development (Harvard University) Working Paper No. 146. Cambridge, MA: Harvard University.
- Hausmann, R., Hidalgo, C. A., Bustos, S., Coscia, M., Simoes, A., & Yildirim, M. A. (2013). *The Atlas of Economic Complexity: Mapping Paths to Prosperity*. Cambridge, MA: MIT Press.
- Hidalgo, C. A. (2018). Economic Complexity: From Useless to Keystone. *Nature Physics*, 14, 9-10.
- Hidalgo, C. A., & Hausmann, R. (2008). A Network View of Economic Development. *Developing Alternatives*, 12(1), 5-10.
- Hidalgo, C. A., Klinger, B., Barabási, A.-L., & Hausmann, R. (2007). The Product Space Conditions the Development of Nations. *Science*, 317(5837), 482-487.
- Jaffe, A. B. (1986). Technological Opportunity and Spillovers of R&D: Evidence from Firms' Patents, Profits, and Market Value. *The American Economic Review*, 76(5), 984-1001.
- Jaffe, A. B., Trajtenberg, M., & Fogarty, M. S. (2000). Knowledge Spillovers and Patent Citations: Evidence from A Survey of Inventors. *The American Economic Review*, 90(2), 215-218.
- Jaffe, A. B., Trajtenberg, M., & Henderson, R. (1993). Geographic Localization of Knowledge Spillovers as Evidenced by Patent Citations. *The Quarterly Journal of Economics*, 108(3), 577-598.
- Lanjouw, J. O., & Schankerman, M. (2004). Patent Quality and Research Productivity: Measuring Innovation with Multiple Indicators. *The Economic Journal*, 114(495), 441-465.

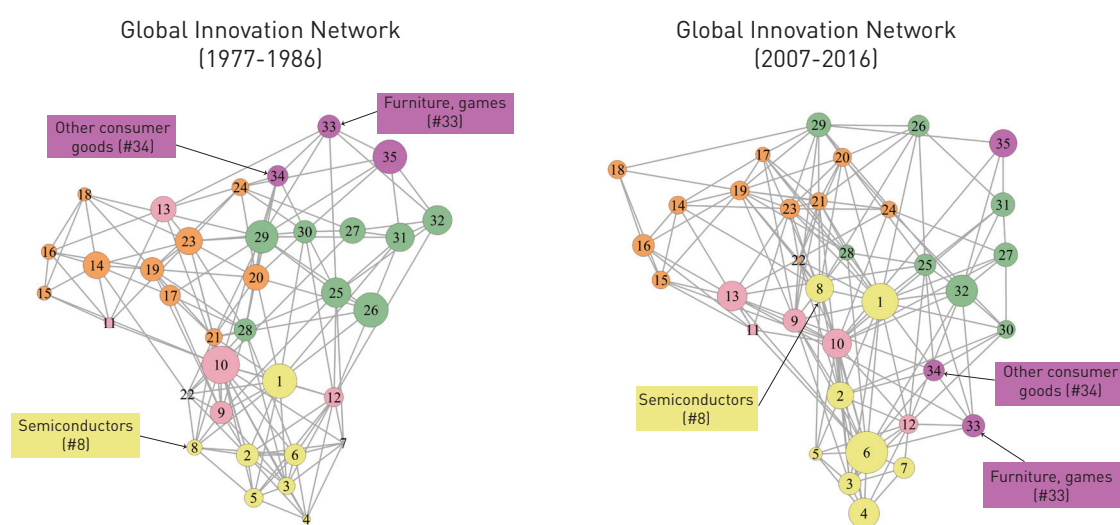


- Lazonick, W., & Mazzucato, M. (2013). The Risk-Reward Nexus in the Innovation-Inequality Relationship: Who Takes the Risks? Who Gets the Rewards ? *Industrial and Corporate Change*, 22(4), 1093-1128.
- Lee, K. (2013). *Schumpeterian Analysis of Economic Catch-Up: Knowledge, Path-Creation, and the Middle-Income Trap*. Cambridge: Cambridge University Press.
- Lee, K., & Kim, B.-Y. (2009). Both Institutions and Policies Matter but Differently for Different Income Groups of Countries: Determinants of Long-Run Economic Growth Revisited. *World Development*, 37(3), 533-549.
- Lêvêque, F., & Mènière, Y. (2006). *Patents and Innovation: Friends or Foes?* CERN Working Paper. Paris: MINES ParisTech.
- OECD (Organisation for Economic Co-operation and Development). (2009). *OECD Patent Statistics Manual*. Paris: OECD Publishing.
- Podolny, J. M., Stuart, T. E., & Hannan, M. T. (1996). Networks, Knowledge, and Niches: Competition in the Worldwide Semiconductor Industry, 1984-1991. *American Journal of Sociology*, 102(3), 659-689.
- Quacquarelli Symonds. (2019). *QS World University Rankings for Materials Sciences 2019*. Retrieved 9 February, 2020, from QS World University Rankings: <https://www.topuniversities.com/university-rankings/university-subject-rankings/2019/materials-sciences>
- Rosenberg, N. (1976). *Perspectives on Technology*. New York: Cambridge University Press.
- Schmoch, U. (2008). *Concept of a Technology Classification for Country Comparisons: Final Report to the World Intellectual Property Organisation (WIPO)*. Karlsruhe: Fraunhofer Institute for Systems and Innovation Research.
- Teo, M., Loo, A., & Kuan, M. L. (2019). Returns to Research and Development (R&D) Among Firms in Singapore. *Economic Survey of Singapore Third Quarter 2019*, 42-50.
- Trajtenberg, M. (1990). A Penny for Your Quotes: Patent Citations and the Value of Innovations. *The RAND Journal of Economics*, 21(1), 172-187.
- U.S. News. (2019). *Best Global Universities for Materials Science*. Retrieved 9 February, 2020, from U.S. News & World Report: <https://www.usnews.com/education/best-global-universities/materials-science?int=994b08>
- Venkatraman, S. S. (2016). "Singaporean" Materials Science: What Does the Future Hold? In F. Boey, B. V. Chowdari, & S. S. Venkatraman (Eds.), *50 Years of Materials Science in Singapore* (pp. 225-228). Singapore: World Scientific.
- Zaccaria, A., Cristelli, M., Tacchella, A., & Pietronero, L. (2014). How the Taxonomy of Products Drives the Economic Development of Countries. *PLoS ONE*, 9(12).

## ANNEX A: GLOBAL INNOVATION NETWORK FOR 1977-1986 AND 2007-2016

The base Global Innovation Network in the article is for the period of 2007 to 2016, in order to reflect patent citations between technology fields in the more recent decade. A comparison with the Global Innovation Network for the period of 1977 to 1986 shows that (i) the network has grown denser over time as patents started to cite across technology fields more frequently (i.e., greater technology spillovers), (ii) the positioning of certain technology fields have changed as they increasingly cited new technological areas (e.g., furniture, games and other consumer goods have become more closely related to the electrical engineering cluster, and (iii) some technology fields (e.g., semiconductors) have started to occupy a more central location in the network [Exhibit A1].

Exhibit A1: Global Innovation Network, 1977-1986 and 2007-2016

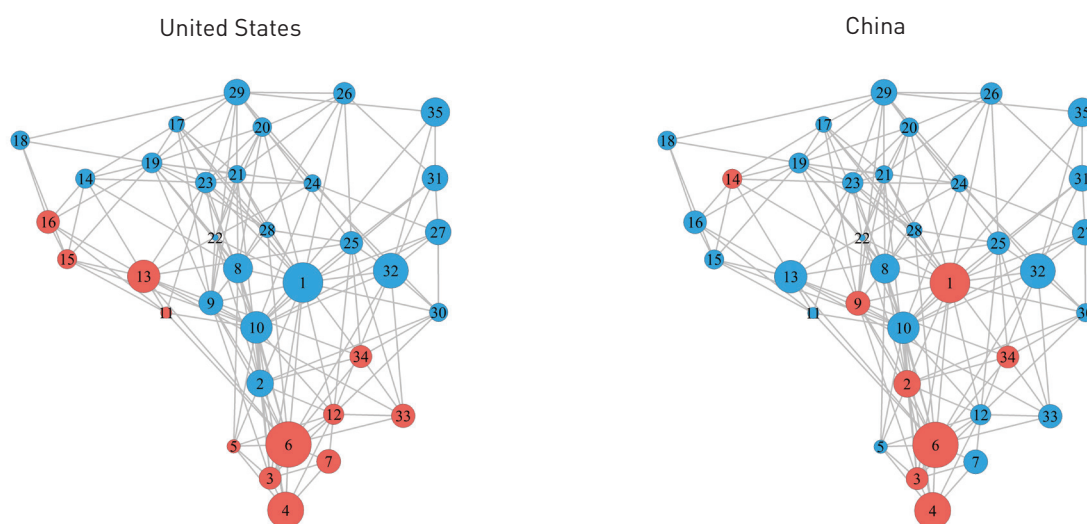


Source: Authors' estimates

## ANNEX B: COMPARISON WITH INNOVATION SPACE OF OTHER COUNTRIES

Singapore's Innovation Space contrasts with that of the two largest economies in the world (i.e., United States and China) [Exhibit B1]. For the United States, its technological capabilities lie in two distinctive clusters – information & communications and biomedical technology, as it has stronger capabilities in technology fields such as Telecommunications (#3), Digital Communication (#4), Medical Technology (#13) and Biotechnology (#15). Similarly, China has built technological capabilities in the information & communications industry, which comprises Telecommunications (#3), Digital Communication (#4) and Computer Technology (#6).<sup>22</sup> However, compared to the United States, China possesses technological capabilities in Audio-visual Technology (#2), rather than Basic Communication Processes (#5) and IT Methods for Management (#7).

Exhibit B1: Innovation Space for United States and China, 2012-2016



Source: Authors' estimates

<sup>22</sup> Between the periods of 2007-2011 and 2012-2016, Singapore's patenting activity in Medical Technology rose by 19.8 per cent, higher than that for Taiwan (16.4 per cent), European Union (3.8 per cent) and United States (0.6 per cent). During this period, patenting activity in Medical Technology in South Korea and Japan also grew robustly, at 51.0 per cent and 47.6 per cent respectively.

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